Vol. 22. No. 9 SEPTEMBER, 1924

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

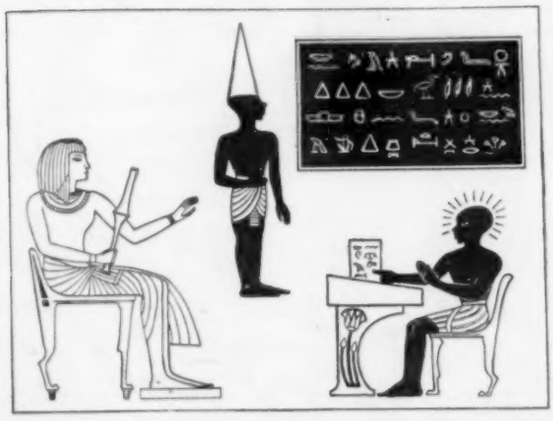
Entered as second class matter February 10, 1903, at the post office at New York under the Act of 1879.

A MONTHLY PUBLICATION RELATING TO THE METAL AND PLATING TRADES

SUBSCRIPTION PRICE PER YEAR, UNITED STATES AND CANADA, ONE DOLLAR; OTHER COUNTRIES, TWO DOLLARS. THE METAL INDUSTRY PUBLISHING COMPANY, 99 JOHN STREET, NEW YORK, U. S. A.

Contents Page 365

EGYPTIAN



FOUR thousand years ago there doubtless were dull and bright blacks in the class-room, but outside of that, black was black.

* * * * *

TO-DAY many different kinds of blacks are recognized. In the Egyptian Lacquer line there are Dull and Glossy Blacks for all finishing purposes on wood or metal.

* * * * *

The Egyptian Lacquer Mfg. Co.

5 East 40th Street, New York

LACQUERS

THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW

VOL. 22 NEW YORK, SEPTEMBER, 1924 No. 9

Aluminum and Some of Its Physical Characteristics

Properties of the Alloys Made by the Aluminum Company of America

About 1887 it was announced that aluminum could be produced commercially, and all sorts of rumors were spread. It was then said that a metal could be obtained that had about one-third the weight of steel, but could be substituted for steel for all purposes, with the result that aluminum, in many instances, was burdened beyond its physical limits. This, naturally, resulted in a reaction and retarded for a time the use of the metal for such work as it was fitted.

In time aluminum found its proper uses and became a valued addition to the list of commercially useful metals.

As a result of experiments made during the last few years, alloys of aluminum have been developed which promise the fulfillment of some of the earlier predictions, and these alloys—both in casting form and fabricated materials, are being used where high tensile strengths are required. It is now possible to obtain in castings tensile strengths from 13,000 pounds to 33,000 pounds per square inch, with elastic limits from 1,000 pounds to 14,500 pounds per square inch.

Table 1 shows the average properties of castings made in the foundries of the Aluminum Company of America.

Aluminum Die-Castings

Die-castings are made in steel dies under pressure. It is possible by this method to obtain castings so close to dimensions that they require very little machining.

Prior to 1920, most aluminum die-castings were made from an alloy of 90% aluminum and 10% copper. Castings of this composition showed tensile strengths of 18,000 to 20,000 pounds per square inch. By the use of aluminum and silicon, and aluminum, silicon and copper alloys, it is now possible to obtain from 23,000 to 33,000 pounds per square inch.

Table 2 will give the physical characteristics of these well known alloys.

TABLE 1

Alloy	Elastic limit, Lb. per Sq. In.*	Yield Point, Lb. per Sq. In.*	Ultimate Tensile Strength, Lb. per Sq. In.*	Elongation, Per Cent in 2 In.	Max. Compressive Strength, Lb. per Sq. In.	(A) Stanton Impact Height of Tup, Inc. 10 Blows to Break	(A) Stanton Impact Height of Tup, Inc. 1,000 Blows to Break	Fiber Stress Fatigue. Lb. per Sq. In. 1,000,000 Reversals to Break	Fiber Stress Fatigue. Lb. per Sq. In. 10,000,000 Reversals to Break	Density.
Al. Sand Cast	1,000	4,000	13,000	23	.....	....	....	.....	.....	2.6
No. 12	6,000	10,000	20,000	1.5	70,000	1.00	0.30	'12,300 to -12,300	'8,800 to -8,800	2.83
S. A. E. 33	6,500	11,000	21,000	1.5	71,000	0.94	0.29	.....	.....	2.85
No. 145	7,000	12,000	27,500	4.5	94,000	2.00	0.47	'12,300 to -12,300	'8,800 to -8,800	2.90
No. 103	....	9,000	20,000	3.5	.....	....	....	.....	.....	2.78
No. 106	3,500	6,000	17,500	7.5	.....	....	....	.....	.....	2.75
No. 109	9,000	15,000	20,500	0.5	.....	....	....	.....	.....	2.89
W. 5% Mg.	....	18,000	25,000	1.0	.....	....	....	.....	.....	2.47
No. 101	14,500	20,000	30,000	None	.....	....	....	.....	.....	3.3
No. 195 Heat-treated	10,000	20,000	33,000	7.	.....	....	....	.....	.....	2.78
No. 43	2,000	5,000	18,000	4.	.....	....	....	.....	.....	2.65
No. 47	4,000	9,000	26,000	7.	.....	....	....	.....	.....	2.65
No. 45	4,000	9,000	20,000	2.	.....	....	....	.....	.....	2.65

*Test samples were cast in green sand. Poured at 1300° F. Test bars about ½" diameter and not machined before testing.

'Figures for Stanton impact fatigue represent height from which a 5.46-lb. hammer dropped to produce rupture in the number of blows given.

TABLE 2

Alloy	Tensile Strength, Lb. per Sq. In.	Elongation, Per Cent in 2 In.	Brinell Hardness 500 Kgm. Load	Specific Gravity
No. 13	23–25,000	1.5%	70–75	2.68
No. 83	25–28,000	2.5–6.0%	55–60	2.75
No. 85	30–33,000	2.5–3.0%	65–70	2.79

Wrought Aluminum

The great bulk of the wrought aluminum produced at the present time by the Aluminum Company of America is either 2S, 3S, 17S, 25S or 51S, which latter three are of the class commonly called "high strength-light alloys" and are susceptible of heat treatment.

Each of the above alloys and the pure metal are commercially available in all or most of the folowing forms: Plate, sheet both flat and coiled, tubing, round, square and oval, bar, rod, wire, shapes both rolled and extruded, rivets, stampings and forgings and screw machine products.

3S possesses greater strength and stiffness combined with considerable ductility, and is somewhat more resistant to some forms of corrosion than is 2S.

The "high strength light alloys" 17S, 25S and 51S differ among themselves in their mechanical properties which involves their fabricating characteristics, and in their methods of heat treatment.

In addition, each of the above materials is available in several tempers and one of them, 17S, in several grades. There is, therefore, a wide range of properties covered by the name "aluminum," some available combination of which should be of interest to most users of wrought metals.

GENERAL CHARACTERISTICS

Certain characteristics are universally associated with the name "aluminum": Lightness, pleasing appearance, resistance to atmospheric corrosion and to many forms of chemical action, and ease of forming. These properties are possessed by all of the alloys mentioned above, although the degree to which each is present may vary considerably with the particular alloy and with the temper.

PHYSICAL PROPERTIES

Electrical Conductivity. Aluminum, when fairly pure, possesses a high electrical conductivity, the value for metal of so-called conductor grade being at least 60% of the International Annealed Copper Standard. Metal of the ordinary commercial purity 2S has a conductivity some few per cent less than that of the pure aluminum, which fact is in accord with the law which holds for all alloys in which solution occurs. The conductivities will vary with the actual composition of the specimen selected and with its temper, the following values are therefore to be considered only as approximate:

2S—60%
17S—35%
25S—35%
51S—43%

Thermal Conductivity. The general statements which have been made under the heading "Electrical Conductivity" will apply also to thermal conductivity. The thermal conductivity of 2S is 0.50 gram calories per centimeter square per centimeter per degree Centigrade; the value for copper in the same units is .9. The figures given above for electrical conductivities may, therefore, be expected to represent fairly closely the thermal conductivities.

Coefficient of Reflectivity. The coefficient of reflectivity varies with the nature of the surface. It is possible to prepare surfaces which will reflect 80% of the incident light. On standing in the air very long periods this reflectivity will decrease more or less depending on the severity of the atmospheric conditions. After several months' exposure in a chemical laboratory the coefficient of several test plates was found to be above 50%.

Density. Due to the slight variations in composition the density will vary with the specimen tested. The following table is, therefore, approximate:

2S—2.70
17S—2.80
25S—2.80
51S—2.69

Tempers and Temper Designations. Aluminum and its alloys have the property which is possessed by other metals and alloys of strain hardening when worked at a temperature below the annealing or recrystallization temperature. The amount of the hardening produced by a given amount of reduction varies with different metals, and aluminum possesses the advantage from the standpoint of workability, of strain hardening rather more slowly than most of the commercial metals or alloys which are commonly used.

Up to a point, which is well along toward the limit which is realized in commercial practice, the increase of tensile strength or hardness which is produced by cold work is directly proportional to the amount of work which is put into the fully annealed material, measuring the work by the reduction of cross sectional area. Beyond this point the rate of hardening increases.

The decrease in elongation follows a different course, the decrease being at first quite rapid, the rate decreasing as the amount of the reduction is increased.

The different tempers of 2S and 3S products are determined by the amount of cold work which has been done subsequent to annealing, in the process of their manufacture. In the case of 17S, 25S and 51S the temper is a designation of the condition as regards heat treatment.

In the case of 2S and 3S the system of temper designation is based on the number of gauge numbers (Brown and Sharpe) reduction by cold work which have been produced by cold rolling subsequent to annealing.

Tubing and bar in 2S and 3S are supplied in soft, ¼ hard, ½ hard, ¾ hard and full hard. The tempers represent the corresponding intervals in the range of tensile strengths comprised between soft temper and the minimum for full hard material. The elongation is, naturally, quite dependent upon the nature and dimensions of the test specimen which in turn will depend upon the dimensions of the material.

As stated previously, the tempers of the alloys 17S, 25S and 51S are based on the condition as regards heat treatment. Aging is accomplished in 25S and 51S only at elevated temperatures, these two alloys may, therefore, be supplied as quenched from the heat treating temperature, and may be formed, then the fabricated article may be artificially aged if desired. In the case of 17S aging proceeds spontaneously at ordinary temperatures; consequently this alloy can not be supplied in the "as quenched" condition. If it is desired in the case of 17S to take advantage of the greater ductility which all these alloys possess before aging has occurred, material in the hard wrought temper should be obtained, and heat treated immediately before the forming operation is to be effected. In general the advantages possessed by the unaged alloy may be realized only within from one to three hours from the time of quenching.

These alloys in the various tempers are also subject to the strain hardening effects which have been mentioned above in connection with 2S and 3S. This fact is of importance in relation to the forming characteristics of the metals.

MACHINABILITY

Aluminum and its alloys can be machined although ease with which these operations can be performed varies considerably from one alloy to another. The tools which should be used for the various operations are different from those which are commonly used for steel or for brass.

MECHANICAL PROPERTIES

The mechanical properties of 2S products vary with the nature of the product, the shape, gauge, size or thickness naturally affecting the test results. The range of tensile strengths from 12,000 pounds per square inch for fully annealed material to from 22,000 to 30,000 pounds per square inch for full hard material is covered in the various tempers of 2S products. The actual strength of the full hard temper will vary with the practice which is used in producing the particular product, the questions of size, shape, gauge, etc., being the determining factors. It should be borne in mind that it is not commercially practicable to produce all sizes of all products to possess the highest strengths of the hard temper range, nor is it possible to produce certain sizes of some products in the hard temper at all. To cite a specific example, the larger sizes of tubing possessing fairly thin wall can not be drawn through the dies without failure after a certain hardness has been produced by cold working.

It is fairly safe to assume, however, that most 2S products may be obtained possessing tensile strengths from 12,000 to 22,000 pounds per square inch. The elongation varies both with the temper and the gauge of the product. The effect of thickness is illustrated by the fact that the elongation of fully annealed 2S sheet may vary from 35% to 15% in two inches in passing from the heavier to the lighter gauges. The influence of the temper of the product may likewise be seen from the fact that for a given gauge of sheet the elongation in the soft temper may be 35% and in the hard temper 4% in two inches.

The percentage elongation of intermediate temper sheet depends upon the direction in which the specimen is cut from the sheet with relation to the direction of rolling. This is especially true of the softer intermediate tempers, the "cross grain" elongation being lower than that measured parallel to the direction of rolling.

The statements made above relative to 2S products are applicable with proper modification of the numerical values to 3S products. The range of tensile strengths comprised by the various tempers is in this case from 16,000 to from 27,000 to 40,000 pounds per square inch for the soft and hard tempers, respectively. The effects of thickness and of temper on the percentage elongation are very similar, soft sheet varying in elongation from 30% to 10% in 2", while for a given gauge the elongation varies from 25% to 3% in passing from the annealed to the full hard temper.

The properties of 17S, 25S and 51S in the heat treated temper are of greatest interest, since, in a sense, the other tempers may be considered as identical to the realization of the fully heat treated condition. The tensile strength which is developed by these alloys on heat treatment is to some extent influenced by the amount of work which has been put into the metal, heavier sections in general develop somewhat lower strengths. As fabricated at the present time, 17S and 25S sheet in thickness up to ¼-in., bar up to ¾ in. and most sizes of tubing may be expected to develop a tensile strength of from 55,000 to 65,000 pounds per square inch and a yield point of from 30,000 to 35,000 pounds per square inch after proper heat treatment and aging. The elongation within this range will vary from 18% to 25% with the possible exception of very thin material. For heat treated and aged material in similar sizes made from 51S the tensile strength will vary from 45,000 to 50,000 pounds per square inch with an elongation from 10% to 18% in 2 in.

Some forming operations can not be accomplished on 17S products, in these cases where slightly lower strength is not objectionable, either of the two modified compositions of this alloy may be used. These are designated B17S and A17S and possess tensile strengths approximately 5,000 and 15,000 pounds per square inch respectively, lower than the alloy having the normal composition and are correspondingly more ductile and possess similar heat treating characteristics.

Each of the above materials has its advantages and its specific fields of application. Questions of cost, strength, stiffness, workability, resistance to corrosion, machinability, ease of welding, etc., combine variously in affecting the choice of the material to be used. It is, therefore, not feasible to cover briefly the relative merits of these different materials, each case being a problem in itself and must be so considered.

Recovering Furnace Bottoms

Q. I am tearing down an old copper refining furnace. Old employees tell me that at one time a charge of ten tons of copper went through the bottom of this furnace. What is the best way to handle this? Can it be cut up with an acetylene torch?

A. This is largely an engineering problem. I have had no personal experience in handling such a proposition but have witnessed the clearing up of two similar jobs.

In the first case the conditions were much as you have described. When the foundation was reached it was found that the molten copper had spread over a good bit of territory and was so intermixed with brick and dirt that it was easily broken up with sledges into pieces that could be handled. They found about one-fifth of the amount reported to have gone through and I presume you will find the same condition as the reports of loss that are handed down are generally exaggerated.

In the second case they found a solid chunk of about two tons. This was laid aside until they made a general repair on the furnace in use. The chunk of copper was raised up and laid on the bottom of furnace, the new roof built over it and it was then melted down.

The acetylene torch will not cut solid pieces of copper. —W. J. Pettis.

Zinc Roofs Under Test

Tests of corrugated zinc roofing are now under way at the Bureau of Standards of the Department of Commerce for the purpose of determining the loads that can safely be carried by this material. Unlike most roofing materials zinc fails not by breaking but by bending slowly under load, the material taking a permanent set. It is, therefore, not considered desirable where heavy loads must be borne continuously, unless it is well supported. But where the normal load is light, as it is apt to be in the tropics, zinc roofing may prove more durable than galvanized steel, as the latter fails rapidly from corrosion in such climates.

The test made on the roofing consists in loading the corrugated sheet with sand, the sheet being supported on a framework representing the roof purlins. The load is left in place for a month or more and the deflection is measured each day.

The Hardened Copper Myth

Chasing the Alluring Will-O-The-Wisp of "Copper Tempered as the Ancients Did It"

Written for The Metal Industry by EDWARD D. GLEASON, Foundryman

What is there so fascinating and alluring in so-called hardened copper as to make the gullible public part with their money and hand it to the promoter for automobiles and meal tickets? It would appear that this standard butterfly chaser bears a charmed life and is one of the best of his kind as a stock seller and a receiver of the "jack" and the "long green."

I was invited by a friend who had invested, to accompany him to one of the large office buildings in New York City (the same setting in any other city would have the same effect), where there was equipment and an exhibit of numerous articles of so called hardened copper. They consisted in part of milling cutters, chisels, edged tools and rotary cutters for working wood, and numerous other layouts. What was the dope of this combination, who had the only real thing of its kind which the government would be glad to purchase, but which they preferred to share with the humble public for their specific benefit at so much per? It consists of 80 parts of copper and 20 parts of tin, no more or less and this was the foundation of numerous patents, one of which consisted of the single claim of adding to the above proportions of Cu and Sn, two parts of carbon, preferably lamp black, and one part borax. This was supposed to hold some peculiar charm of putting the finishing touches to the alloy. The learned foundryman knows that this is a good cover as flux for alloys of this kind.

Some of these hardened copper patents contain modicums of alum and pyrite; others copper and silicon. Of the latter I saw numerous barrels, that had been cast into shears waiting their disposal by the "angel" who had paid for them. They will, no doubt, find their way into junk.

This specific bronze, 80-20, herein mentioned, has really some merit behind it, outside of the case herein cited, and when cast in French sand, the face of which has been atomized with silicate of soda, full strength and half water, to which some graphite has been added, makes a very fine casting which has a filing temper and which holds its edge as well as carbon steel quenched in water and drawn to a blue or purple. Tools made from it will work or machine any soft metal like copper, low brass, silver and gold, tin sheet (iron), German silver, etc. I have seen blanking and forming dies made of it that would have cost thousands of dollars if made of carbon steel and worked up in the shop through regular procedure of the machinist. I have also seen large and complicated punches of intricate contour and design for cutting out leather made of it in lieu of steel; rotary cutters and tools in their many ramifications have been made. For this, bronze will hold a cutting edge that is surprising and good enough for the purpose. The crowd I met selling stock, had a line of cutlery, hatchets, axes, hammers, chisels and a milling machine equipped with cutters of supposed hardened copper, doing service at short intervals during the lectures gave ocular demonstrations of a cutting tool. True, it is hardened copper, but not in the sense it is commonly supposed to mean, along the lines of a lost art of pre-historic age, which is bunk.

Man's earliest knowledge of bronze implies a still earlier knowledge of copper, for just as the pre-historic peoples of North America made their weapons and tools from the small masses of copper, which they hammered into acceptable shape, we therefore believe that prior to the beginning of the bronze age, primitive man fashioned the smaller copper masses into his needed implements. As man progressed in experience and came in time to discover other metals, especially tin, he found the melting together of these two metals produced a new metal—an alloy superior in all respects to its constituent metals. This alloy we call bronze and the interval of time covering the general use of it is called the "bronze age."

The lost art of hardened copper is a myth. Chisels found were alloyed by the ancients with copper and tin. This combination is today doing business along the same lines.

What show has hardened copper alongside of high speed tool steel? Exactly the same show as a snow-ball has in a hot July sun. But the fickle lay mind prefers the bunk because it is up in the planets, and they fall for it. "You pays your money and you takes your choice."

We are on the threshold of many changes in the great field of metals of which steel has ruled king. Its position is being threatened by those who have been pioneering in the fields of the alloys. The inventor who can produce a new metal with the strength of steel, non-corrosive and lighter in weight, is already on the horizon.

For high speeding cutting tools, the following is one of many: nickel 86.4 parts, aluminum 6 parts, silicon 6 parts, zirconium 1.5 parts, cobalt 1 part. There is an untarnishable metal for cutlery which contains no chrome or iron, and is composed of copper, nickel and silicon, has a tensile per sq. inch of 135,000; elongation 36 per cent. It has the same beautiful color as silver. It will hot forge and roll cold and the only value silver has compared with it, is its intrinsic one.

The state of the art is indicated by the following patents, a small proportion of the total issed.

UNITED STATES

993,042—1911. Driver Harris Company. Ni, 50; Mn, 10 to 20; Cu, balance.

1,175,724—1916. Driver Harris Company, Cu, 45; Ni, 45; Cr, 10; electrical resistant.

961,217—1910. Driver Harris. Fe, 65; Ni, 30; Al, 5; electric resistant.

981,542—1911. 1. Driver Harris. Cu, 60; Ni, 30; Mn, 10; electric resistant.

981,542—1911. 2. Driver Harris. Cu, 45; Ni, 45; Mn, 10; electric resistant.

981,542—1911. 3. Driver Harris. Cu, 75; Ni, 10; Mn, 15; electric resistant.

981,542—1911. 4. Driver Harris. Cu, 65; Ni, 20; Mn, 15; electric resistant,

981,542—1911. 5. Driver Harris. Cu, 70; Ni, 10; Mn, 20; electric resistant,

981,542—1911. 6. Driver Harris. Cu, 60; Ni, 20; Mn, 20; electric resistant,

981,542—1911. 7. Driver Harris. Cu, 50; Ni, 30; Mn, 20; electric resistant,

981,542—1911. 8. Driver Harris. Cu, 40; Ni, 40; Mn, 20; electric resistant,

981,542—1911. 9. Driver Harris. Cu, 65; Ni, 10; Mn, 25; electric resistant,

981,542—1911. 10. Driver Harris. Cu, 60; Ni, 15; Mn, 25; electric resistant,

981,542—1911. 11. Driver Harris. Cu, 55; Ni, 20; Mn, 25; electric resistant,

981,542—1911. 12. Driver Harris. Cu, 55; Ni, 15; Mn, 30; electric resistant,

981,542—1911. 13. Driver Harris. Cu, 50; Ni, 20; Mn, 30; electric resistant,

981,542—1911. 14. Driver Harris. Cu, 50; Ni, 15; Mn, 35; electric resistant,

981,542—1911. 15. Driver Harris. Cu, 40; Ni, 20; Mn, 40; electric resistant,
274,250—1919. 1. Driver Harris. Fe, 19; Ni, 79; electric resistant.
127,250—1919. 2. Driver Harris. Fe, 11; Ni, 68; Cr, 15; Ti, 4; Mn, 2.
127,250—1919. 3. Driver Harris. Fe, 27; Ni, 65; Ti, 8.
1,274,250—1919. 4. Driver Harris. Fe, 19; Ni, 65; Ti, 6; Mn, 10.
1,274,250—1919. 5. Driver Harris. Fe, 24; Ni, 60; Cu, 12; Ti, 1; Mn, 3.
1,274,250—1919. 6. Driver Harris. Fe, 19; Ni, 60; Cu, 12; Ti, 6; Mn, 3.
1,274,250—1919. 7. Driver Harris. Fe, 35; Ni, 40; Cu, 15; Ti, 6.
1,274,250—1919. 8. Driver Harris. Fe, 54; Ni, 30; Cu, 10; Ti, 6.
1,274,250—1919. 9. Driver Harris. Fe, 64; Ni, 30; Ti, 6.
1,274,250—1919. 10. Driver Harris. Cu, 10; Ni, 80; Ti, 3; Mn, 7.
1,274,250—1919. 11. Driver Harris. Ni, 75; Ti, 8; Mn, 17.
1,274,250—1919. 12. Driver Harris. Cu, 45; Ni, 45; Ti, 3; Mn, 7.
1,274,250—1919. 13. Driver Harris. Fe, 1; Ni, 94.
1,012,391—1911. Marsh. Ni, 80; Cr, 18; Al, 2; acid resistant.
1,057,423—1913. Haynes Company. Cr, 25; W, 15; Mo, 5; resistant to HNO_3
1,221,769—1917. Cooper. Ni, 65; Mo, 10; Zr, 25, resistant to acids.
1,257,272—1918. Baird. Ni, 75; Si, 25; acid resistant.
385,945—1888. O'Hara. Steel, 6½; Ni, 13½; Cu, 80; non-magnetic.
873,746—1907. Haynes. Ni, 70 or less; balance, Cr; does not corrode.
901,428—1908. Dempster. Fe, 20; Ni, 62; Cr, 13; Mn, 5; acid proof and electric resistant.
397,699—1889. Cowles. Cu, 63.3; Ni, 33.3; Al, 3.3; tensile 100,000.
1,180,996—1916. Gaskill, (1). Al, 2; Pb, 1¼; Cu, 56; Ni, 15; Zn, 25; Mg, 1 oz.; machinable alloy.
1,180,996—1916. Gaskill, (2). Al, 2; Pb, 2; Cu, 50; Ni, 10; Zn, 35; cast alloy.
1,180,996—1916. Gaskill, (3). Cu, 33; Ni, 33; Zn, 32; Mn, 2; surgical instruments.
485,423—1892. O'Neill. Sn, 3; Cu, 45; Ni, 36; Zn, 18; Si, ½; for wire contacts for electrical instruments.
578,465—1897. Parnecott. Fe, 7; Cu, 44; Ni, 20; Zn, 25; Co, 3; Mg. 1; non-corrosive to sea water—high tenacity.
1,244,742—1917. Jones. Fe, 1½; Cu, 28; Ni, 68; Mn, 2½; Va, 1/5; resist acids.
959,156—1910. Nauty & Scanlon. Cu, 45; Cr, 5; Ni, 25; Zn, 25.
1,168,962—1916. Pease. Cu, 88.4; Al, 6.6; Fe, 1.96; Si, 1.60, non-corrosive.
1,147,398—1916. Heneimier. Al, 75-85; Ni, 5-15; Cu, 7-10; resists corrosion.
1,173,172—1916. Oakley. Ni, 67; Fe, 1-5; Cu, balance; valve metal.

BRITISH ALLOYS

No. 13,413.—1913. Pasel. Fe, 59; Ni, 36; Cr, 5; same coefficient as glass.
No. 8,270.—1914. Joice. Steel, 10; Cu, 40; Ni, 45; Al, 5; jewelry setting.
No. 8,270.—1914. Joice. Steel, 10; Cu, 35, Ni, 50; Al, 5; jewelry setting.
68,270—1914. Joice Steel, 5; Cn, 27; Ni, 65; Al, 25; jewelry setting.
No. 19,564. 1909. Siemens & Halske. Ni, 20; W, 80; acid resisting.
No. 23,775.—1912. F. Houston Company. Fe, 54; Ni, 46; same expansion as glass.

GERMAN ALLOYS

243,663—1912. Borcher & Barth. Sn, 12 to 3; Cu, 80 to 90; Co, 8 to 2; resists dilute $H NO_3$.
246,035.—1912. Borchers & Mounarts. Fe, 35; Mo, 2-5; Cr, 62; resists all acids and alkalies.
255,919.—Borchers & Borchers. Cr, 30; Ag, 1½-2½; Ni, balance; acid resisting.
277,242—1914. Siemens & Halske. Ni, 70; Tantalum, 30; resists aqua regia.
66,937.—1893. Solvesky. Sn, 5; Ni, 1; Al, 90; Cd, 4; resists corrosion.

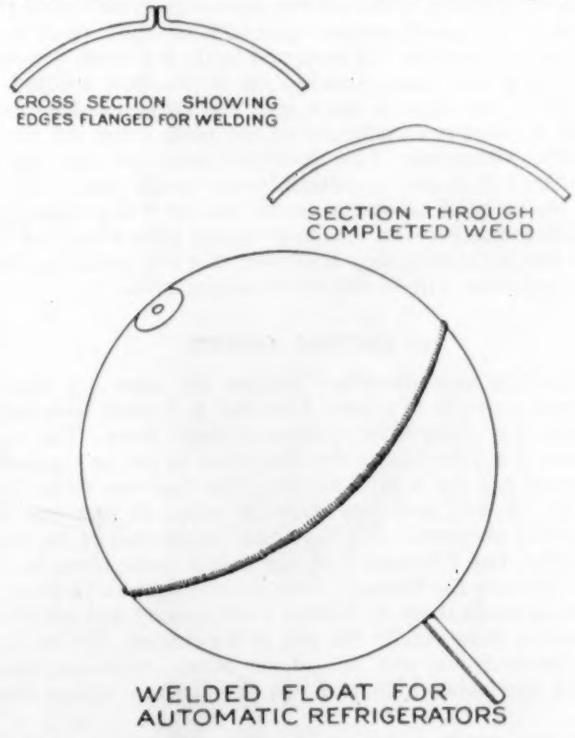
Welding Versus Silver-Soldering

Often the superintendent of a metal shop—either an independent shop or an integral part of a factory—becomes dissatisfied with his fabricating equipment, or realizes that his old equipment is preventing him from competing with others, either in quality or price. Methods of joining may be causing trouble. In getting the best way out, the advice of an oxy-acetylene service man or engineer often proves valuable.

As an instance, a certain concern manufacturing automatic refrigerators were already using the oxy-acetylene process to fabricate units of the ammonia system. The tanks were welded but the floats and the connections to tanks and coils were silver-soldered. Due to the length of joint and consequently the comparatively large quantity of solder used, this method was proving very expensive. So another way of accomplishing the same result and one employing the oxy-acetylene process was deemed necessary. The refrigerator manufacturer sought the advice of an oxy-acetylene service engineer.

The floats in question were 2⅝ in. in diameter, made up of two hemispherical sections spun from 25 gauge steel, the edge of one section being slightly crimped so as to telescope with the other. It was at this joint that the silver solder was applied.

The engineer suggested that if the hemispherical sections of the floats could be pressed with edges flanged outward, they might then be held together in a jig which would revolve them slowly and the edges could then be fused together under the heat of the oxy-acetylene flame. The manufacturer accordingly had a number of sections made up in the manner suggested and the engineer welded several sample floats. After completion the spheres were tested by subjecting them to an internal air pressure of 100 lb. per sq. in. while submerged in a tank of water, and were found to be air tight. The plant officials were highly pleased with the results and decided to adopt this method of fabricating the floats, thereby eliminating expensive silver soldering.—Oxy-Acetylene Tips.



Casting Metals

A Variety of Melting and Molding Troubles and Their Solutions*

Written for The Metal Industry by WILLIAM J. REARDON, Foundry Editor

ALUMINUM RUNNING BOARDS

Q.—I am having same trouble with the enclosed casting which I hope you can help me eliminate. This casting is used on automobile running boards and must take a high polish. The main trouble we have had is from pitting which mars the finish. We also have some trouble from cracks in the rail at the back and front.

We are using heavy crank case scrap in a natural draft coke furnace carrying a No. 80 pot. We use no charcoal or other cover over the pot. The sand is moderately rammed Windsor Lock, molded from loose patterns on a plaster follow board. The metal is poured as cold as it will run.

1. Kindly advise us what you think would be the best foundry equipment for casting about 200 per day?

2. What is the best polishing lathe and wheel for this job?

3. What is the proper pattern equipment? Are there any automatic molding machines which could be used on this type work?

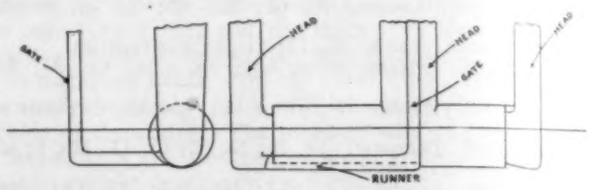
A.—In reference to the casting used on automobile running board the main trouble is from pitting which mars the finish. We shall call this trouble No. 1. Automobile foot plates are very simple castings to make, and there can be no possible trouble, but faulty metal. The general cause of pitting is pouring at too high a temperature. You also state that the metal is poured as cold as it will run. If you pour any aluminum casting much over 1,500° F., the practice will be sure to give you trouble; 1,350° F. will give you better results.

In answer to question No. 1. "What is the best foundry equipment to cast 200 plates per day?" would say that all that is necessary is to cast two aluminum match-plate patterns. Any good pattern shop will have this work done for you if you are not equipped to do the work yourself. The cast aluminum match-plate is the best method of molding this class of work, and can be rammed by hand with a vibrator attachment on the plate either for air or electric vibrations. One hundred molds per day can be produced from such a pattern by any handy man. Any of the air or hand squeezers on the market will produce 140 to 150 molds per day. As to polishing lathe wheel for this job, the polishing job is so simple that any polishing lathe you may have will do this work satisfactorily.

CASTING COPPER

Q.—The superintendent told me the other day that he wanted a couple of copper bars cast in a short time and I believe it is going to be up to me to make them. The more I sized it up, the bigger the job looked to me, so concluded I would ask for a little advice. The bars are to be 3½" x 3½" x 36", and they must be solid, as they are for electrical purposes. We have San Diego sand in the brass foundry, but I believe I would rather make them in the iron foundry for the sand there is more open and I thought I would make them horizontal (not on end) and put three risers on them exactly the size of the casting, 3½" x 3½", one on each end and one in the center, make my risers about ten inches high and run the castings with a small gate about half way between the end and middle riser. However, I am going to do as you say and would be very grateful for your advice on the matter as I do not want to fall down on the job if it is up to me to make them. Will you please tell me in plain English how to go about it, and do you think it advisable to have a second pot of metal to feed up the risers with?

A.—We are of the opinion that your plan of molding will insure you success as far as the molding is concerned. The only suggestion we would make is to use a facing sand on the mold, consisting of ten shovels of your regular brass molding sand and ten shovels of iron foundry new sand and one shovel of pitch compound and gate the casting into the riser, giving the metal a long run similar to sketch; black lead the mold.



GATES FOR COPPER CASTING

Your greatest difficulty will be to deoxidize the metal. As you are going to use these castings for electrical purposes only a very small amount of deoxidizer can be used, and a high conductivity is necessary and so the greatest care must be taken in melting the metal. Keep the metal covered with charcoal all the time, get the metal good and hot and add 3 oz. of 10% Silicon copper per hundred pounds of metal melted. Stir well and take a test before pouring by pouring a sample 2" x 2" in an open mold. This can be made by punching your sprue cutter in the sand about 2" deep. If the metal is deoxidized it will go down, and if not, it will come out of the mold and should not be poured, as the casting would be useless. However, if you are cautious in melting you will be repaid for your trouble. We also suggest that a spoonful of salt be added to the crucible before taking from furnace; also approve extra pot to feed the risers. W. J. REARDON.

Rolling Manganese Bronze

Q.—Kindly advise if in your opinion a casting and rolling of brass into sheets is more difficult than manganese bronze.

A.—As a general rolling mill proposition, the working of manganese bronze from the casting of same to the finished rolling is more difficult than working brass.

The brass, we assume, to be the ordinary brass of commerce. A straight copper-zinc alloy running from 64 to 66 of copper, and in widths from 6" to 15".

In making very wide sheets, the manganese bronze being an alloy that will hot-roll easily, can be broken down from the casting more cheaply than an alloy that will not lend itself to this process, like common high or drawing brass, which must be broken down cold, and this in wide metal is a very expensive operation and would justify the statement that the manganese bronze was less difficult to work.—WM. J. PETTIS.

*Previous problems in this series have been published in our issues of January, February, March, April, May, June, July and August, 1924.

A List of Alloys

Reprinted from the Booklet Published by the American Society for Testing Materials. Part 10*

By WILLIAM CAMPBELL†

TIN BASE ALLOYS

	TIN SN	ANTIMONY SB	COPPER CU	LEAD PB	OTHER ELEMENTS
Minofor	66.	20.	4.	....	Zn, 9.
Navy Bearing	89.	7.3	3.7	....	
Navy Bearing, Hard	80.	15.	5.	....	
Parsons White Brass	60.	....	5.	....	Zn, 35.
Parsons White Brass	81.	11.	4.5	3.5	
Parsons White Brass	76.	6.	5.	13.	
Pewter	80.	....	....	20.	
Pewter	73.5	5.5	1.	20.	
Pewter	88.42	7.16	3.54	....	Zn, 0.88
Pewter	89.3	7.6	1.8	1.8	
Pewter	87.2	5.7	1.6	11.5	
Pewter	89.3	7.6	1.8	1.8	
Pewter	84.7	1.7	6.8	....	Bi, 6.
Phosphor Tin	95.	....	....	....	P, 5.0
Phosphor Tin	90.	....	....	....	P, 10.
Plastic Metal	80.5	8.6	9.5	....	Fe, 1.4
Poterie d'Etain	90.	9.	1.	....	
Prince's Metal	84.75	15.25	....	....	
Queen's Metal	50.5	16.5	....	16.5	Zn, 12.5
Queen's Metal	87.	8.5	3.5	....	Zn, 1.
Queen's Metal	73.36	8.88	....	8.8	Zn, 8.88
Queen's Metal	88.5	7.1	3.5	....	Zn, 0.9
Queen's Metal	88.5	7.	3.5	....	Bi, 1.0
Ships Nail Alloy	50.	17.	....	33.	
Silver Foil	90.	....	....	....	Zn, 10.
Silver Foil	97.5	....	2.5	....	
Stanniol	96.2	....	1.	2.4	Ni, 0.3; Fe, 0.1
Tinfoil	87.5	0.5	4.	8.	
Tourun Leonard's Metal	90.	....	10.	....	
Trabuk Metal	87.5	5.	....	....	Ni, 5.5; Bi, 2.
Tinsel	60.4	....	....	39.6	
Tutania, Cast	91.4	....	0.7	7.62	Zn, 0.25
Tutania, Cast	92.4	4.6	2.5	0.32	Fe, 0.13
Tutania, English	80.	16.	2.7	....	Zn, 1.3
Tutania, Plate	90.	....	2.7	6.0	Zn, 1.3
White Metal, Hanover	86.8	7.6	5.6	....	
White Metal, Dutch	81.5	8.8	9.6	....	

LEAD BASE ALLOYS

	LEAD PB	TIN SN	ANTIMONY SB	COPPER CU	OTHER ELEMENTS
Accumulator Metal (Condenser Foil)	90.	9.25	0.75	....	
Aluminum Solder, Frismuth	27.	67.	....	....	Al, 3.
Antifriction	60.	....	20.	....	Zn, 20.
Antifriction	88.	....	12.	....	
Antifriction	84.	....	16.	....	
Antifriction	78.8	....	19.6	....	Zn, 1.
Antifriction	77.	10.	12.5	0.5	
Antifriction	77.	8.	14.	1.	
Battery Plates	94.	....	6.	....	
Bearing	80.5	11.6	7.4	0.5	
Bearing (Katzenstein)	77.6	7.3	16.8	0.4	
Bearing	73.0	8.5	18.0	0.4	
Bearing	68.0	9.6	20.5	1.6	
Bearing	71.	7.7	18.5	2.	
Bearing	62.5	26.2	10.	1.3	
Bearing	61.0	25.0	13.0	1.0	
Bearing	48.	40.	10.	2.	
Bearing (American)	46.	36.5	16.5	1.0	
Bearing	40.	42.	16.	2.	

*This booklet can be obtained from THE METAL INDUSTRY for $1. Parts 1, 2, 3, 4, 5, 6, 7, 8 and 9 appeared in our issues of March, April, May, July, September, December, 1923; June, July and August, 1924.

†Professor of Metallurgy, School of Mines, Columbia University, New York.

	LEAD PB	TIN SN	ANTIMONY SB	COPPER CU	OTHER ELEMENTS
Bearing	37.	50.	12.	1.	
Bearing	25.5	61.	10.5	2.8	
Bearing	11.8	74.	9.5	4.7	
Bearing	10.	75.	12.	3.	
Bearing	86.	1.	13.	....	
Bearing	83.3	8.3	8.3	8.	
Bearing	82.	2.	16.	....	
Bearing	80.	10.	10.	....	
Bearing Compagnie de l'Est	80.	12.	8.	....	
Bearing	80.	5.	15.	....	
Bearing	76.	7.	17.	....	
Bearing, American Railroad	73.5	8.	18.5	....	
Bearing, French Railroad	70.	20.	10.	....	
Bearing, Paris-Lyon-Mediterranean Railroad	70.	10.	20.	....	
Bearing, American Railroad	68.	21.	11.	....	
Bearing, Graphite Metal	68.	15.	17.	....	
Bearing	62.	27.	10.	....	
Bearing	60.	20.	20.	....	
Bearing, Chemin de fer de l'est Franc	42.	42.	16.	....	
Bearing	40.	45.	15.	....	
Bearing, Italian Railroad	37.	38.	25.	....	
Bearing	10.	75.	15.	....	
Capsule Metal	92.	8.	....	....	
Clichier Metal	46.	33.	....	....	Cd, 21.
Clichier Metal	50.	36.	....	....	Cd, 14.
Clichier Metal	32.5	48.	10.5	....	Bi, 9.
Clichier Metal	5.	80.	....	....	Bi, 15.
Electrotype Metal	93.	3.	4.	....	
English Linotype	83.	5.	12.	....	
English Stereotype	82.5	4.5	13.	....	
Frary Metal	98.	....	....	....	Ba Ca 2.
Fahlun Brilliants	40.	60.	....	....	
Foil-Lead (Calin)	86.5	12.5	....	1.0	
French Auto	75.	10.	15.	....	
For Small Castings	5.	75.	20.	....	
Glievor Bearing	76.5	8.	14.	....	Fe, 1.5
"Glyco"	80.5	4.5	14.5	....	As, 0.5
Hard Lead	80.	46.	12.	0.5	
Hoyle's Metal	42.	46.	12.	....	
Jacana Metal	70.	10.	20.	....	
Locomotive Bushing	65.6	8.8	15.4	....	
Linotype Metal	85.	3.	12.	....	
Mackenzie Metal	70.	13.	17.	....	
"Magnolia"	78.	6.	16.	....	
"Magnolia"	79.75	5.	15.	....	Bi, 0.25
Marine Babbitt	72.	21.	7.	....	
Metallic Packing	82.25	4.75	....	....	
Metallic Packing, Compagnie d'Orleans	76.	14.	10.	....	
Mystic Metal	88.7	....	10.8	....	Bi, 0.1
Non-pareil	78.35	4.95	16.7	....	
Noheet	98.41	0.08	0.11	....	Na, 1.4
Pewter	11.5	87.2	5.7	1.6	
Pewter	20.	80.	....	....	
Piston Packing, Compagnie de Nord	73.	12.	15.	....	
Shot Lead	99.8	....	....	....	As, 0.2
Solder	60.	39.	1.	....	
Plumbers	66.6	33.3	....	....	
Half and Half	50.	50.	....	....	
Tinman's	33.3	66.6	....	....	
Stereotype Metal	82.	6.	12.	....	
Stereotype Metal	82.	3.2	14.8	....	
Stereotype Metal	76.	4.	20.	....	
Stereotype Metal	70.	7.	23.	....	
Stereotype Metal	67.	17.	18.	....	
Stereotype Metal	35.	60.	5.	....	
Tandem	77.7	5.9	16.8	....	
Tea Lead	98.	2.	....	....	

This list will be continued in an early issue.—Ed.

The Molding Machine in the Jobbing Foundry

What Type of Machine to Use and How to Operate It

Written for The Metal Industry by R. R. CLARKE, Foundryman

Remunerative machine practice must be considered in two distinct phases; first, where the individual casting demand is light and short-lived; second, where requirements are heavy and long continued. For convenience these phases will be designated respectively as jobbing and manufacturing conditions. Between the two are wide margins making for sharp distinctions in practice. Manufacturing methods in the job shop will often kill profit outright while job shop systems in the manufacturing plant may cut advantage to a minimum.

It is the author's observation that many job shops underrealize on machines simply by adhering to manufacturing principles and vice-versa. The main distinctions are time, rigging and initial cost as compared with the unit of saving and its applying period. A fundamental is that no matter how great or small this unit may be, it must go beyond initial expense to show a profit and that both saving and increase of production are matters of final analysis rather than momentary consideration. On neglect of this very simple principle many of the fallacies of molding machine "profit" are constructed.

THE MOLDING MACHINE IN THE JOB SHOP

Between manufacturing and jobbing, the advantage lies overwhelmingly with the former. The jobbing man must therefore abandon all hope to rival the manufacturer in either time, cost or production. He must, in short, be content with less elaborate equipment at less initial cost and abide a comparatively reduced tonnage at increased cost. He must also use a more sure and practical judgment as well as exercise greater alertness in order at once to discern his points of advantage and profitably apply them. He certainly has neither time nor money for experimenting with them or to await their slow dawning on him. What he does must be quick, cheap, practical and sure from the word "go," otherwise initial expense and loss will absorb all profit. Having had experience in both elements I do not hesitate to declare that the jobbing shop is by far the more difficult proposition, and that without a man with brains and strong practical sense, the jobbing executive had better keep his fingers off molding machines. If you seek further evidence on that statement go to the many job shops that have tried machines only to discard them. They have found, what all experience will disclose, that the conditions are not inherently there; they must be created.

TYPE OF MACHINE BEST SUITED TO THE JOB SHOP

Jobbing involves a wide and diversified range of work. The most elastic machine is therefore the most logical choice. As previously argued, the jolt-squeeze is the all around machine and to my mind the most adaptable to the conditions in question. It is the one machine I would choose in preference to all others for straight jobbing work. By it you can jolt and squeeze or simply jolt or squeeze according to the demand. Next in order is the plain squeeze for which jobbing conditions include diversified opportunities. Whether these machines be hand machines or power machines depends entirely on local conditions with respect to equipment and casting demands.

Regarding the hand-ramming machines, they are frequently used in the job shop, though on a large scale the practice would appear questionable. The hand-ramming machine is merely a pattern drawing mechanism and primarily a duplicating proposition. When it is considered that the pattern plate designed for hand-drawing can be both rammed and drawn as rapidly as the hand-ramming plate designed for machine drawing, the cost of the machine and the often greater cost of the machine plate appear doubtful wisdom especially on the short-run job. In specific instances it is frequently a paying affair but as a general proposition the hand-ramming-pattern-draw machine is out of place in the average job shop.

With respect to efficiency regarding increased production and decrease in cost, job shop machine molding will vary widely with conditions. As a general average it ought to and will range from 50 to 100 per cent better than the hand method. In many cases it will do more, in many others less. A job running for a single day, for instance, hardly affords the operator opportunity to strike his stride. If continued for a week, results are much different. This along with various other changing factors will easily show how the range of machine efficiency can vary from 50 to 300 per cent over the hand method and we shall not tarry to supplement with examples. An item not to be over-looked is that increase of production and decrease of cost ought not necessarily to proceed on a parity. It is generally conceded that machine molding skill is not on a par with that of hand molding and a corresponding adjustment is justified in the fixing of prices and wages.

With the machine bought and paid for, the main item of expense in machine molding is the pattern plate, mounted and ready to work. This must be done as quickly, cheaply and efficiently as possible and calls for judgment and efficiency of high order. The best plan is to have in reserve a number of plates or boards or frames such as previously described and in anticipation of incoming orders. If metal plates, they should include matching holes or markers. If wood plates, brads can be trusted to attach patterns temporarily. With these at hand any incoming pattern or patterns can be readily and inexpensively mounted by resorting to the different methods previously discussed. In making and attaching the gates, runners, etc., probably the best foundry method is to make a mold, cut neat correct gates, pour in white metal, and attach to the plate. Following this a trial mold should be made, carefully checked in detail, and if found right, the plate can then be given over to regular production and dismounted when finished in order to be available for another pattern. As to the proper mounting method in different instances it might be said that this is altogether a matter of judgment and conditions.

A few common examples might lend to elucidate. Suppose the customer furnishes 6 split patterns for ordinary sized bushings, these 6 patterns being sufficient to fill the flask. The feasible plan, then, is to mount these half-patterns on the opposite side of the same plate by the mold-to-plate method. But suppose only three patterns are furnished instead of six. The best method, then, would be to mount the six half-patterns on one side of a plate and equidistant from center lines. In that way the flask could still be filled without the expense of additional patterns. Suppose again three flat-back ring patterns are furnished and the flask has room for six. Mount the ring patterns all on one side of the plate, make a number of drags from this plate. From the same plate make an equal number of copes and reverse the copes end for end in closing over the drags. There will then occur three

castings in the drag and three in the cope of the same mold or six castings in all.

The solid plate with patterns cast integral can be profitably used in the job foundry on patterns of irregular parting lines provided the castings desired will stand the double shrinkage and provided further the number of castings ordered are sufficient to justify the expense of the solid plate. Though comparatively inexpensive this type of plate will often cost more than expected especially when it involves any great amount of finishing pains. The plaster of paris frame plate can be admirably used in all cases of irregular parting on those patterns that will not admit any change in their dimensions. It has the further advantage of requiring practically no pattern finishing and is therefore, cheap, reliable and efficient. Examples of its possibilities lie in such patterns as brush holders, carbon boxes, cap-nuts, cope-extending gaskets, bushings, cast on end, and many others. The above constitute but a few of the many possibilities of plate-mounting and machine molding patterns in the job shop.

In executing the work it should be kept in mind that in most cases it is only a temporary affair calling for only such time and expense as will be necessary to its abbreviated service. Of course when the pattern represents heavy demand, oft-recurring, a more durable and efficient equipment is in order. In mounting any plate for job shop work the best molding ideas should be used. Gates should be proved and correct, pattern arrangement logical and sure and all other molding items correspondingly safe. On short run orders it does not take many casting "bulls" to eat up profit, and a molding machine is a great scrap maker when its pattern plates represent bad molding principles.

The type of flask we like best for general jobbing machine work is the 12" x 16" two-pin steel flask with pins and holes in the middle of the end of the flask rather than off to the side. This, however, is saying nothing against the snap flask of different sizes, for which any job shop will often have demand. For machine molding and whereever adaptable the snap flask is speedy and efficient, but of itself it does not cover the jobbing field in full. To whatever extent it can be used, however, the argument is all in its favor.

A rather narrow idea regarding the molding machine is that it can be used only in connection with pattern plates. The fact is that it can be used wherever an operation can be covered by it. In the job shop this expands the field considerably. Any gated-up pattern hand-drawn, and many loose patterns, too, can be rammed up complete by the molding machine often at a decided advantage as compared to the straight hand method, and there is no good reason why the machine should not be so employed. In different classes of work for instance the drag of a mold requires nothing whatever except four or five jolts while the cope needs nothing but squeezing. Such a mold the machine will ram in less than one-half the time of hand ramming. Very often very plain copes cover more difficult drags and vice versa. If necessary, hand ram the difficult part but why not squeeze or machine ram the other? The argument is simple enough and in keeping with the general principle of jobbing experience, namely that to get the most out of the machine keep it busy by using it whenever and wherever you can.

With respect to the heavier class of work or big machines, it can be said that jobbing foundries doing considerable of this kind of work will often find them a paying proposition. If used for no other purpose than ramming those molds that involve long, hard work for hand ramming the heavy machine will in many job shops find a very favorable environment. As in the case of the smaller type though, the machine should be used wherever and whenever it can be made to apply.

Though the average job shop is denied the conditions of an elaborate molding machine system, it is well to remember and strive for those arrangements and working methods conducive to maximum advantage and result. Foundry layout, molding machine quarters with respect to furnaces, cleaning room, etc. time studies in the different operations, systems of metal transportation of mold handling of sand riddling, flask and bottom board disposition, etc. are always worth while even though on a smaller and less elaborate scale than in the ideal element. To this end all those items of auxiliary equipment such as sand cutters, power riddles, mold conveyors, etc. that will make the work to that degree faster, better and cheaper and show an ultimate profit over the slower and more cumbersome methods, are objects to which the jobbing man may often well address his serious consideration.

Speeding Jewelry Production

Increasing the Application of Welding Process in Production*

Two of the outstanding attributes of the oxy-acetylene welding process are the precision with which the flame can be regulated, and the accurate limits within which it can be applied to welding work. These factors are of great consequence in many common applications of the process, but in no single industry are they more important than in the manufacturing jewelry trade. Oxy-acetylene welding is being used to advantage in a number of branches of the jewelry industry. It is employed on practically all of the metals handled, particularly in cases where speedy quantity production is desired.

Probably the widest field of application for oxy-acetylene welding is in the manufacture of seamless bracelets and rings of various kinds. Welding has improved the product and greatly increased the speed of production with a proportionate decrease in the cost of manufacture.

One manufacturing jeweler, whose output consists solely of seamless gold and platinum wedding rings, uses the oxy-acetylene welded joints exclusively.

Another outstanding example is an installation of oxy-acetylene equipment in use at the shop of a manufacturing jeweler located in the East. Oxygen and acetylene cylinders supplying the gases for welding are located on the side of the bench opposite that on which the operators sit, and thus may be replaced without disturbing the latter. Flexible hose connects the cylinders to permanent pipes running along the bench and supported by brackets as shown in the picture above. The welding blowpipes are connected to outlets in these pipes, which outlets are fitted with cut-out valves. The object of these valves is to permit taking any one blowpipe out of service without affecting the other welding stations.

An important advantage in this case has been the additional speed which oxy-acetylene equipment has enabled the operators to attain. This speed makes it possible for them to increase their own earning power, as they are generally paid on a piece basis and has correspondingly lowered the plant's production cost through the increased production without increased overhead expense.

*From Oxyacetylene Tips.

Finishing Auto Bumpers

By T. C. EICHSTAEDT

Q.—1. Please give me a formula for a nickel solution for plating automobile bumper bars.

2. Also please outline the best method and process for plating and buffing these bumpers, the bars to be rust proof and of a high nickel finish.

A.—1. A solution made up of the following formula which the writer has been recommending for some few years and using himself during the past 16 months, should give the best results and be as near rust proof as any nickel deposit can be.

7½ lbs. single nickel salts
1½ lbs. double nickel salts
½ lb. magnesium sulphate
½ lb. boracic acid
5 gallons of water

This can be easily figured out for any amount of gallons of solution required.

The solution is made up by filling the tank in which the solution is to be used a little over half full of clean, cold water; then dissolving the nickel salts in a separate tank or drum of steel by boiling with steam (an open steam pipe being inserted) and adding the salts until all the required salts are dissolved, and then adding this boiled solution into the water in the plating tank.

Then dissolve the magnesium sulphate by boiling also and adding this to the solution in the plating tank. Add the required amount of water to fill the tank. Spread the boracic acid over the surface of the solution in the plating tank and let it stand over night. The boracic acid will all be dissolved by the next day. Add 1 pint of hydrofluoric acid for each 100 gallons of solution, place anode rods on tank and hang anodes in solution. Make all necessary connections and start plating.

This solution should stand 16° Baume scale hydrometer test. A current density of 12 to 15 amperes per sq. ft. can be used in a still tank with still cathode. But in a moving cathode or agitate solution 20 to 24 amperes per sq. ft. of cathode surface can be used.

If in a still tank, a good deposit can be obtained in a half hour; if in a moving cathode or agitated solution a good deposit can be obtained in 15 to 20 minutes.

A bright deposit can be obtained by dissolving 1 oz. of cadmium chloride in a bucket or pitcher of the solution and added to the solution; stirred well at night. Additions of cadmium chloride and hydrofluoric acid must be added frequently as the solution is used depending upon how hard the solution is worked.

A.—2. Quite a few bumper manufacturers are striking their bumper bars in nickel 5 to 10 minutes; then striking 10 minutes in an agitated copper sulphate solution; then finishing in a regular hot nickel solution for 15 minutes; buffing the last coat of nickel only. It seems to be giving good satisfaction.

The writer, however, does not think this good practice, but recommends rather that the bars be cleaned in an electric cleaner of the copper cleaner combination after first being soaked in a soaking solution made up of some good cleaner for this purpose. There are many on the market. After soaking, a good combination copper cleaner is made up of 2 ozs. caustic potash, 2 ozs. soda ash per gallon, ¼ oz. copper cyanide, ¼ oz. sodium cyanide per gallon, and 1 quart of sodium silicate per 100 gallons of solution, using a double throw switch and using the reverse current for ½ to 1 minute, and then the direct current for 1 to 2 minutes, depending upon how good the copper is throwing. It should produce a good copper strike in less than 1 minute, if all is working correctly. Then rinse in hot water, then in muriatic or hydrofluoric acid dip, made up to 6° hydrometer test, then in cold water and into the nickel solution for 10 minutes if a hot solution is being used, or 15 minutes if a still solution is being used. Then rinse in cold water and place directly into the sulphate copper solution for 20 minutes hereby obtaining a heavy copper deposit that will stand a real buffing and coloring operation. While this is an extra buffing, it will pay as the finishing coat of nickel will not need to be as heavy or need nearly as much buffing.

Some one is saying, "Then you have two plating operations." Yes, true, but the last one for nickel is easy after the copper buffing. The bumpers are again racked and simply run through the combination copper cleaner with the direct current on, then rinsed in the hot water again and then in the muriatic or hydrofluoric acid and rinsed in cold water; then into nickel solution for 15 to 20 minutes. A bright solution can be kept for this purpose and the color buffing operation will be easy and a very bright nickel lustre will be obtained that will stand for a long while and can be easily kept bright by a little attention of the owner or chauffeur.

There are a few so-called patented processes for special plating that are not fully developed as yet and until they are proven of special value in this special line of work the foregoing method is as good as any up-to-date. If done properly, it will stand any test required for rust proof electro-plating.

Nioblis Rings

Q.—I should like to run colors such as bright red, green and pink into a nickel plate. Can you advise me on this.

A.—Your idea, if we surmise correctly, is to produce what is termed Nioblis rings; a finish that has been known for many years and has been referred to in many authentic works on electro-plating. The colorations are quite beautiful. They result from peroxide of lead films produced upon a nickel plated surface. The brighter the finish the brighter the colors. Bequerel's formula for such colorations is as follows:

Water	1 gallon
Litharge	10½ ozs.
Caustic Potash	14 ozs.

The water should be heated to the boiling point. The caustic potash should be added to the cold water first before heating. Then add the litharge with constant stirring. The solution is ready for use when cold. The articles to be colored are made the anode; positive connection for the cathode, either a piece of platinum or copper wire can be used. The articles to be colored should lie flat in the solution; the cathode wire moved over it in forward motion, so that a wave motion results. The colors are then more beautiful and consist of every color of the rainbow.

After coloring, wash carefully and dry out in cold water or denatured alcohol. A thin film of olive oil wiped over the articles so colored will protect the finish. If you have other methods in mind, let us hear from you. The only other method we know of is the spray method of applying colored pigment lacquers. You cannot equal the colors of the lead peroxides with pigment lacquers.—C. H. PROCTOR.

Plating Investigations

Report of Researches on Electrodeposition at the Bureau of Standards July 1, 1923—June 30, 1924*

In order to make the results of research more directly available to persons engaged in commercial electroplating, lectures on nickel deposition were given during the year to branches of the American Electroplaters' Society in about twenty-five cities. Numerous commercial plants were visited, and in some cases apparatus developed at the Bureau has been loaned to those in the industry in order to test the methods and conclusions of our work. The Research Committee of the American Electroplaters' Society has met at the Bureau twice during the year. They have also conferred frequently with George B. Hogaboom, who is employed in an advisory capacity.

The International Association of Electrotypers have requested a special investigation of the problems involved in nickel electrotyping and have provided for the employment of a research associate for the year beginning July 1, 1924.

The work conducted during the past year has related almost entirely to nickel deposition.

NICKEL ANODES

A laboratory study of the behavior of nickel anodes has been completed and the results were published in the Monthly Review (March, 1924). Further observations will be required to determine the exact bearing of these results upon the use of anodes under commercial conditions. The Bureau has arranged to co-operate wherever possible in making such observations in commercial plants.

CONDUCTIVITY OF NICKEL SOLUTIONS

The electrical conductivities of solutions containing nickel sulphate and such salts as are commonly added to nickel baths were determined, and the results were published in the Monthly Review (June, 1924).

POTENTIALS, CATHODE EFFICIENCIES AND THROWING POWER IN NICKEL DEPOSITION

The metal distribution and "throwing power" of various typical nickel-plating solutions were determined, using the apparatus and method recently developed at this Bureau. In conection with such measurements, valuable data have been obtained upon the cathode potentials and efficiencies, which may throw light on the mechanism of nickel deposition.

The results will be published soon in the Monthly Review.

DEPOSITION OF NICKEL ON ZINC AND DIE CASTINGS

Work on this problem has been interrupted, and just recently renewed. The subject is being studied from the standpoint of the potentials involved and the effects upon such potentials produced by various additions to the solutions in order to determine whether an effective, cheap and easily controlled solution can be used for this purpose. Tests will then be made on an industrial scale in order to learn whether such a method is commercially practicable.

PROTECTIVE VALUE OF NICKEL COATINGS ON IRON AND STEEL

A large amount of exploratory work has been required in order to select suitable methods of testing and to determine the relative effects of the important variables. The results obtained have permitted a revision of the original rather extensive program. This revised plan is just being investigated. Before definite conclusions can be reached, large numbers of samples must be prepared and tested under various conditions. The tests to be applied include porosity, resistance to corrosion, hardness and adherence.

REPORT OF THE RESEARCH ADVISORY COMMITTEE

Report of the Research Advisory Committee of the American Electroplaters' Society, in attendance at the Research Advisory Committee meeting, June 13 to 14, 1924, at the Bureau of Standards, Washington, D. C.

The members of the Research Advisory Committee of the American Electroplaters' Society, Charles H. Proctor, S. E. Hedden and O. J. Sizelove, attended the Research Advisory Committee meetings on electroplating at the Bureau of Standards, Washington, D. C., on June 13 and 14, and are pleased to report to the Supreme President of the American Electroplaters' Society, J. E. Sterling, and the Executive Board as follows:

The program as outlined by the Bureau of Standards was as follows:

FRIDAY, JUNE 13TH

10 A. M.—(a) General scope and policy of the researches, publications and conferences.
(b) Co-operation in observation of nickel anodes under commercial conditions.
(c) Plating specifications:
(1) Nickel
(2) Silver
2. P. M.—(d) Throwing Power in Nickel Deposition, H. E. Haring.

SATURDAY, JUNE 14TH

9:30 A. M.—(e) Protective Value of Nickel Plating on Iron and Steel, C. T. Thomas.
(f) Nickel Plating on Zinc, M. R. Thompson.
(g) Future plans.

The meeting was called to order by Dr. Wm. Blum, followed by Dr. Hillebrand, chief of chemical division, who welcomed the Advisory Committee in behalf of the Bureau of Standards.

Dr. Blum outlined the scope of the work for the present session and later Dr. George Burgess, Director of the Bureau of Standards made a short address to the visiting committee. He stated that he was always pleased to welcome the various interested committees that visited the Bureau of Standards to co-operate with the Bureau, and personally he felt that such co-operation aided commercial industry to reach a higher plane in production and enabled the manufacturing interests of the country to reach a standard for their products.

Charles H. Proctor responded to Dr. Burgess and voiced the sentiments of the members of the Research Committee that it was a pleasure to them to co-operate with the Bureau of Standards and believed such joint meetings would result in great benefit to the industry they had the pleasure to represent.

The only regret was that the representative membership from the branches of the entire American Electroplaters' Society was not present to listen to the results of the work accomplished by the Bureau, since the previous meeting in November last. It is hoped, however, by the time of the next meeting, presumably in November next year, that arrangements can be perfected so that a representative membership from each branch may be able to be present.

* From The Monthly Review, July, 1924.

The first paper presented for the consideration of the Research Committee was "Throwing Power in Nickel Deposition," by H. E. Haring. This paper was very interesting indeed. Mr. Haring showed by drawn plans and curves the results of addition agents in nickel solution.

The throwing power factors chiefly to be considered are:

First—Increase in cathode polarization with increased current.

Second—Resisting of solution.

Third—Change in efficiency with change in current.

The report of the members who have experimented with the throwing power boxes furnished by the Bureau in a measure confirm the work done by Mr. Haring. When the completed work of Mr. Haring is published in pamphlet form it will no doubt prove of unusual interest to the members of the Society in its definition of throwing power.

The second paper was by C. T. Thomas entitled "Protective Value of Nickel Plating on Iron and Steel."

The work of Mr. Thomas is not completed. His experiments so far have been to determine the most efficient formula to use for nickel solutions that will bring about the much desired results in a greater protection of nickel-plated steel products.

The third paper was by M. R. Thompson entitled "Nickel Plating Zinc." This is a very important subject, as every one knows, who have endeavored to nickel plate direct upon sheet zinc or zinc-plated steel products.

Mr. Thompson's work is far from completion. The results, however, so far obtained are very promising to the Research Committee.

After the presentation of the papers as outlined and discussion upon the results by the Research Committee and responses by the authors of the papers, the session was brought to a close.

A conference followed covering the "Future Plans of the work of the Bureau Staff."

Starting about July 1 they have arranged to study the special problems of nickel electrotyping.

The International Association of Electrotypers has provided funds for the salary of one chemist, in addition to whom, one of the regular staff will be engaged in this study.

Most of the information thus far acquired on nickel deposition from experiments so far made by the Bureau staff may find application in the problems of electrotyping.

Completion of the researches of nickel will probably require most of the Bureau staff's attention, engaged in the study of nickel deposition till July 1, 1925. It has been suggested that the next major product should be the study of brass plating.

It was the opinion of the Research Advisory Committee that a study of the possibilities of producing a more substantial rust-resisting builders' hardware, etc., made from steel upon which copper, bronze and brass is deposited, would prove of great interest to the builders' hardware and other similar hardware industries.

By planning such work in advance it may be possible in the interval to initiate studies of the literature and to develop methods of attack.

In submitting this report the Advisory Research Committee believes that the work in electrodeposition so far accomplished by the staff of the Bureau of Standards and the future work planned will prove of great value to every member of the Society.

They therefore pledge in behalf of the Society a continuation of the co-operations and support of its entire membership to reach these much-desired results.

George B. Hogaboom, electroplating advisor to the Bureau of Standards was present.

Test for Acid Copper Solution

By WILLIS R. KING*

The following is a simple method of testing acid copper solutions to determine if they are properly balanced or whether they require additional metal, acid or water.

When a tank of new solution has been made, remove a small portion of it and keep it in a stoppered bottle or make one gallon of new solution by accurately measuring and weighing the different ingredients, either of these solutions to be used as a standard from which the comparative tests are to be made.

Take 4 fluid ounces of the new standard solution and add to it all the carbonate of copper (dry) it will take up (which will be the saturation point)—80 grains may be safely added as a beginning, about 100 grains will be the limit. Allow a reasonable time for the solution to take up the carbonate of copper after which the solution should be fairly clear and free from cloud or sediment. If it is not clear it is an indication that too much carbonate of copper has been added. In this case repeat the operation using a smaller quantity of carbonate of copper until the saturation point has just been reached.

The metallic content of the original or standard solution is the saturation point minus the quantity of carbonate of copper that has been added to reach that point. When this has been determined, a record only of the quantity of carbonate of copper added is all that will be needed for future use.

Take 4 fluid ounces of the working solution that is to be tested and add to this the same quantity of carbonate of copper (dry) that was added to the standard solution.

If the solution readily takes up this quantity of carbonate of copper and more can be added it is an indication that the solution needs more metal. Then add carbonate of copper in very small quantities until the saturation point has just been reached, keeping accurate account of the additional quantity that has been put in. This additional quantity added to each 4 ounces of the working solution will then give it the same metallic content as the standard solution.

As 1 gallon contains 128 fluid ounces the 4 ounces used for testing purposes represent 4/128 or 1/32 of a gallon, consequently the additional quantity of carbonate of copper added to the 4 ounces of solution should be multiplied by 32 in order to determine the quantity of carbonate of copper to be added per gallon of working solution.

If the test should prove the reverse, meaning that the solution did not take up the same quantity of carbonate of copper that was added to the standard solution to reach saturation point, it is an indication that the solution needs acid. Then add sulphuric acid a few drops at a time until all the carbonate of copper has been taken up, keeping accurate account of the quantity of sulphuric acid that has been added to the 4 ounces and multiply this quantity by 32 to determine the quantity of sulphuric acid to be added to each gallon of the working solution.

If after properly balancing the metal and acid content of the solution a hydrometer proves the specific gravity to be too high, it should be reduced by the addition of water until the standard degree has been reached.

* From Bedell's Practical Electro Plating, reviewed in THE METAL INDUSTRY, October, 1923, p. 411.

Some Aspects of the Platinum Stamping Law

A Paper Presented Before the American Chemical Society, April 24, 1924, at Washington, D. C.*

By CALM MORRISON HOKE, A.B., B.S., A.M.†

On many occasions I have talked to jewelers, and tried to tell them what chemists thought about platinum. Today I shall try to tell the chemists what the jewelers are concerned about, and why.

As we know, we have national laws for the protection of buyers of gold and silver. The growing use of platinum makes us need laws for the protection of platinum buyers also. Since we chemists buy much of the world's output as chemical ware, and also a certain portion in our private capacities in dental work and an occasional piece of jewelry, we must understand the issues, which will shortly be threshed out in our legislature.

New York and Illinois already have platinum stamping laws. By these, if an article is stamped, or even billed as **platinum**, the parts that look like platinum must be 925/1000 platinum GROUP metals. Not necessarily platinum at all; in other words, a piece of palladium may legally be stamped "platinum."

When the laws were passed this caused no embarrassment, platinum being much the cheapest of the group. The 75/1000 leeway was allowed, partly to permit base-metal hardeners—iridium the ideal hardener being very expensive—partly to allow for the solder in jewelry, and partly to allow for the unavoidable admixture of impurities.

But lately great embarrassment has arisen. Palladium is now much cheaper than platinum—$80 as against $115. This difference is even greater in effect, since palladium being only about half as heavy as platinum, goes twice as far. In fact, by using an alloy of about 25% palladium, the metal cost of a given article is about 40% less than if iridio-platinum were used.

This is being done now on a large scale, and has caused much confusion in the jewelry world—two articles, identical in appearance and in stamping, are of very different intrinsic value. Naturally some jewelers have turned this situation to advantage and there have been many charges of unfair competition.

I know that chemists view with equanimity, if not with amusement, the alarms of the jewelry world, as if to say, What is it to us? And yet—it is something to us.

First, the chemist wants exactness and integrity in all things. Second, since he buys much platinum, the matter does concern him directly, even though at present it is the jewelers who are articulate. The dental people are already suspicious of their metal, and we must realize that if palladio-platinum can be sold to a jeweler as platinum, it can also be sold to a chemist—if the law permits and the dealer thinks he can get away with it.

It is generally agreed that our present laws must be repealed, and a national law passed. The problem is to frame a national law that will be just to all,—chemist, jeweler, dentist and dealer,—and enforceable.

There are some among the jewelers who demand a national law that will permit only platinum or iridio-platinum to be stamped or sold as "platinum." Alloys with other metals must get along without the stamp, or have a stamp of their own. This group is led by many of the oldest and most honorable names of the industry. To them the use of a cheaper alloying material is a substitution and a deception, and they will have none of it. And there are other reasons against encouraging these alloys, which the most unsentimental chemist may appreciate.

Another group wants a law that will encourage the use of palladium alloys. This group contains certain dealers who sell palladium, and many jewelers. Its members are of many shades of opinion, and range from the men who sincerely admire the palladio-alloys, to the men who frankly want to sell palladium under the platinum stamp at platinum prices. It is generally believed that if an article is plainly marked "palladium" that it will not be salable.

This second group makes these claims, among many others:

(1) That the use of palladium as an alloying material will **spare**, that is, save for other purposes, that much platinum.

(2) That by cheapening platinum jewelry it can be brought within the reach of more people. (Note that statements 1 and 2 contradict each other in effect.)

(3) That palladio-platinum is whiter than iridio-platinum. (This is vigorously denied by many, and has not been heard so much recently.)

(4) That the use of palladio-platinum will also spare some iridium, since palladium itself hardens platinum a little. Thus, one palladium alloy contains 5% iridium, but is about like 10% iridio-platinum in hardness. Another, advertised to contain 6% iridium, is found on test to be a little harder than 5% iridio-platinum, but of course goes much farther.

(5) That it is no more "wrong" to sell palladium under the platinum stamp, than to sell iridium under the platinum stamp.

The actual effect upon the trade of the introduction of palladio-platinum has undoubtedly been to increase the output of platinum jewelry. The selling points offered by the fact that palladio-platinum, stamped platinum, can be sold at a lower price than the ordinary iridio-platinum, has appealed to the retailer's natural bargain-loving instinct, and more "platinum" jewelry has been made and sold than ever before.

The first mentioned group, which might be called the Old Guard group, make the following statements:

(1) Palladium is not platinum. No matter how fine a metal may be in its own right, it is wrong to sell it under a different name; it is doubly wrong to sell a cheaper metal under the name of a more expensive one. On this rock they build their cause.

(2) Palladium is a very valuable metal in dentistry; it can also be made into good jewelry for those who want palladium jewelry. Let it travel under its own name. This was done in England during the war.

(3) In refining and remelting platinum alloyed with palladium, there is much more loss than in the refining and remelting of iridio-platinum. Hence the "sparing" effect mentioned above is partly neutralized.

To explain: It is easy to remelt iridio-platinum, and the losses are so slight as to be negligible. It is harder to remelt palladio-platinum; palladium has the curious trick of occluding large amounts of gases when hot, and these come out again on cooling, causing more or less spitting, spattering, and actual loss of the metal.

It is also easier to refine iridio-platinum filings, scrap, etc. In the method used by most jewelers, the filings are covered with aqua regia, which removes gold, etc., and

* Published with the permission of the Journal of Industrial and Engineering Chemistry.

†Consulting Chemist, the Jewelers' Technical Advice Company, New York.

at the same time dissolves a small amount of the iridio-platinum. But aqua regia dissolves a much larger proportion of palladio-platinum. This means more aqua regia to handle, from which gold, platinum, iridium and palladium also must be recovered. The recovery is harder, and the chances of actual loss are greater.

(4) That the professional refiners, when refining filings, scrap, etc., generally give no credit for the palladium that is turned in, even if it is 20% of the platinum. They recover it themselves, however, and so are accused by some of feathering their own nests unjustifiably.

(5) Iridio-platinum scrap, when remelted, will be brittle if even small amounts of base metal or gold are present. Thus it automatically keeps itself pure. If impure, it cannot be worked. On the other hand, palladio-platinum can be melted in with considerable quantities of other metals, and still present a good appearance. As a result many workmen, often innocently, sometimes not, have made up illegal alloys. These are rarely detected because of the expense of a platinum assay.

This fact—the flooding of the market with adulterated metal—has brought about an alarming loss of integrity and moral fibre among certain jewelers, and is probably the most important phase of the matter from the humanitarian viewpoint. An ancient and honorable industry is in danger of losing its own soul.

To the chemist, however, a fact of great importance is the shortage of iridium. Since the Russian mines have been closed, most of the platinum crudes that have come in have been relatively low in iridium, and high in palladium. If we persist in making up 5% and 10% iridio-platinum alloys, when our crudes run only 2% or 3% iridium, we shall get into trouble. It is the old problem of making our bread and jam come out even—and here we have a shortage of jam! This fact, which was pointed out by James M. Hill and Dr. Howe, was enough to make the most devoted iridium-lovers think twice. Especially as some of the very important electrical uses call for 15% or 30% iridio-platinum. It served to increase the dislike which the technical world already felt for the whole idea of using platinum in jewelry.

It is interesting, therefore, to learn that the latest advices promise an increase in the iridium supply. The recognition by the British Government of Soviet Russia means that it will not be long before the great Russian sources will be open, not only the mines but also the stores of metal that have been hoarded during the past decade of terror. Moreover, the new South African deposits, recently discovered, run high in iridium and osmiridium, some of which has already reached this country. Further, the electrical industry, while still using large amounts of iridium and platinum, is also using increasing quantities of tungsten, molybdenum, and other metals, with apparent satisfaction. Finally, the latest Government reports show that the stock of iridium and platinum in the hands of refiners on December 31, 1923, was 5,208 ounces of iridium and 36,554 of platinum,—or roughly 14% as much iridium as platinum. Perhaps the bread and jam will come out better than we thought.

There are other groups with other ideas as to what the platinum stamping law should encourage, and what it should forbid. Some agitate for the stamping of the exact assay, forgetting that very few pieces of jewelry are large enough for such a stamp. One very able suggestion is for two standards, one based on platinum, one on palladium. Some wish to encourage the use of base-metal hardeners, some want to forbid it.

Thus we see that the problem is partly technical, partly ethical, partly a financial fight, and partly sentimental. I have by no means covered the question—a full discussion would take hours. For instance, there is the possibility that rhodium and ruthenium will become common enough to be factors in the discussion. This seems very possible indeed. And there is the difficult question of whether or not to permit gold or base-metal hardeners.

Several proposed laws have been drafted by the jewelers' organizations. They are based on the assumption that if two materials are of different intrinsic value they must not be stamped the same. Mostly it is agreed that a slight leeway or tolerance must be allowed in unmanufactured metal to allow for the impurities of commercial refining methods. Also that a greater tolerance must be allowed the **manufactured** article if it contain solder.

We, as human beings, will hope that the law as finally passed will prevent deception. As chemists, we hope that it will truly prevent the loss to society of any of these precious metals.

DISCUSSION

Following the reading of this paper, Dr. James Lewis Howe, one of the foremost of the chemists interested in platinum, the compiler of the great Bibliography of the Platinum Metals, spoke briefly.

Dr. Howe's main interest, in common with that of most of the chemical world, is the conservation of the platinum metals to the chemist and the engineer. He spoke of the great need for iridium in the technical world. He referred again to the fact that for some years the supply of iridium has been inadequate to take care of the needs of the industrial world; that comparing the amount of platinum secured, with the amount of iridium secured, it was plain that if jewelers use much 10% iridio-platinum there will not be enough iridium to go around. He called attention to the fact that a rise in price does not discourage the jewelry buyer or make him cease buying jewelry—on the contrary, the high price is an added attraction—but a rise in price does discourage the industrial worker. He believed that a stamping law that insists upon an iridio-platinum standard would cripple the electrical industry.

Die Casting in the Ford Plant

It is announced that the casting of aluminum in dies has been developed on an extensive scale at the Highland Park plant of the Ford Motor Company. For a long time die casting was looked upon as an impossibility. The old method of casting in sand molds permits gases to go through the sand as the hot metal is poured in, while pouring metal into dies or solid molds caused air bubbles to form, resulting in so-called "pockets" in the casting, thus leaving an inferior product. Then the secret of feeding the molten metal into the dies from underneath was discovered.

The die is placed directly above the pot containing the hot metal. In fact, it takes the place of a lid. When a casting is to be made all the operator has to do is to turn the air pressure onto the hot metal. The pressure forces the metal up through a feeder into the die, and up to the top of the latter. As the metal goes in the air is forced out through minute vents provided for the purpose. As the top of the die is filled first, the casting naturally solidifies from that point downward. The air is forced out by the first rush of molten metal to the top of the mold, and as metal only can enter by the feeder all danger of air bubbles is eliminated, and the casting is perfect.

Among the principal parts cast in this department are fan-belt pullies, the daily production being 10,500. Magnet supports are turned out at the rate of 140,000 each day, while 4,500 sedan moldings, 7,400 window regulators and 8,000 priming rods are daily averages.—F. J. H.

The Foundrymen's Convention in Milwaukee

Place of Twenty-eighth Annual Convention and Exhibit of American Foundrymen's Association, October 11-17, 1924

Members are cautioned to be sure to have all the dates correct for the period October 11 to 17, inclusive. The Exhibits open 1 p. m. Saturday, October 11, closing at 10 p. m., closed Sunday, and open from 8:30 a. m. to 5:30 p. m. Monday, October 13, to Thursday, October 16, inclusive. The Convention program begins Monday a. m., continuing through Thursday p. m., while Friday, October 17, will be set aside as plant visitation day in the Milwaukee District.

It is authorized by the Executive Committee of the Institute of Metals Division of the A. I. M. E. to announce that they will meet as usual in joint convention with the A. F. A.

This will be the first convention held west of Ohio since the convention in Milwaukee in October, 1918. As then, all activities, including registration, meetings, and exhibits, will be held in the Milwaukee Auditorium. This building has exceptional accommodations for all these events.

The tentative program, printed below, gives promise of making this meeting the most important one ever held in this or any country. The requests for exhibit space already exceed the total of space used at Cleveland in 1923. Listed among the exhibits are many new and interesting features.

A big feature of Convention Week will be the presentation at the annual business meeting on Wednesday, the 15th, of the first A. F. A. gold medals, in recognition of meritorious achievements in the foundry industry. The annual banquet will be held Wednesday evening.

TECHNICAL PROGRAM FOR MILWAUKEE MEETING

SESSION PLANNED FOR DISCUSSION OF DEVELOPMENTS IN THE FOUNDRY INDUSTRY

Molding sand research, and aluminum alloys are subjects to be given special attention at the 1924 meeting as planned by the program and papers committee. The sessions as tentatively scheduled are as follows:

MONDAY, OCT. 13, P. M.

Session 1. Joint meeting of the A. F. A. and Institute of Metals Division of the A. I. M. E.—Brass Foundry Practice.

TUESDAY, OCT. 14, P. M.

Session 3. Joint Session of the A. F. A. and Institute of Metals Division of the A. I. M. E.—Aluminum and Aluminum Alloys for the Foundry.

Session 4. Apprentice Training.

TUESDAY, OCT. 14, P. M.

Session 6. Molding Sand Investigations.

WEDNESDAY, OCT. 15, A. M.

Session 7. Molding Sand Investigations.

WEDNESDAY, OCT. 15, P. M.

Session 9. Business session and awarding of Penton and Whiting Medals.

Session 10. (To convene after the business session.) Industrial Relations.

APPRENTICE TRAINING

The session on Apprentice Training will be held in the Auditorium of the Milwaukee Industrial School. Because of the success with which Wisconsin as a state is meeting in reviving apprentice training, and the number of Wisconsin foundrymen who will be in attendance at this meeting, this session should prove of exceptional value to foundry managers from other sections of the country where apprentice training, while greatly desired, is not being carried on successfully.

MOLDING SAND INVESTIGATIONS

Exceedingly interesting papers and committee reports on molding sand investigations will be presented at the two sessions scheduled to take care of this topic. Important results in testing sands will be explained by the chairmen of the sub-committees of the Joint A. F. A. and National Research Council Committee on Molding Sand Investigation. Control of molding sand conditions will be discussed by foundry executives who have been using the sand testing methods advocated by the Joint Committee and described at the Cleveland Convention. Test results on large numbers of samples of sand collected by the various State Geological survey departments and tested by the committee will be described and discussed.

MEDAL AWARDS

A special occasion is to be made of the business session scheduled for the afternoon of Wednesday, October 15. At this time the first awards given under the provisions of the Penton, Seaman, McFadden and Whiting Award funds will be made in the form of medals to Enrique Touceda and John Howe Hall for their meritorious achievements in the fields of the malleable and steel casting industries respectively. These medals are described elsewhere in this bulletin.

PAPERS TO BE PRESENTED

A partial list of the papers and their authors is given herewith. A full program will be announced later.

"Making Copper Castings from Cupola Melted Metal," by T. F. Jennings, Garfield, Utah.

"Founding of Brass in Mexico," by H. H. Miller, Torreon Company, Mexico.

"Art Bronze Work," by J. F. Arnold, Mt. Vernon, N. Y.

"Production of Aluminum Alloy Pistons in Permanent Molds," by R. J. Anderson, Pittsburgh, and M. E. Boyd, Detroit.

"Aluminum Silicon Alloys," by D. Basch, The General Electric Company.

"Salvage of Aluminum Alloy Castings by Welding and Soldering," by R. J. Anderson, Pittsburgh, and M. E. Boyd, Detroit.

"Relation of Composition to Strength in the A. S. T. M. Bar," by J. W. Bolton, Niles Tool Works, Hamilton, O.

J. B. Ford Company Omitted

The name of the J. B. Ford Company, Wyandotte, Mich., manufacturers of the well known Wyandotte metal cleaner, was inadvertently omitted from the list of exhibitors of plating supplies published in connection with the report of the American Electro Platers' Society convention in our July issue. This unintentional omission was all the more regrettable because the company's local staff at Milwaukee was quite active in making the convention a success.

THE METAL INDUSTRY

With Which Are Incorporated

THE ALUMINUM WORLD, COPPER and BRASS, THE BRASS FOUNDER and FINISHER
THE ELECTRO-PLATERS' REVIEW

Member of Audit Bureau of Circulations and The Associated Business Papers, Inc.

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, United States and Canada $1.00 Per Year. Other Countries $2.00 Per Year :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order; Cash Should Be Registered

ADVERTISING RATES ON APPLICATION. FORMS CLOSE THE FIRST OF THE MONTH

Palmer H. Langdon.....Editor and Publisher
Adolph Bregman.....Managing Editor
George W. Cooper.....Advertising Manager
Thomas A. Trumbour.....Business Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
Telephone Number: Beekman 0404. Cable Address: Metalustry

Vol. 22 New York, September, 1924 No. 9

Contents

EDITORIAL

METAL RESEARCH

That research in non-ferrous metals is going on apace is being more and more forcibly brought to the attention of every observant person interested in these industries. A report by Dr. R. S. Hutton on the work of the British Non-Ferrous Metals Research Association delivered before the Empire Mining and Metallurgical Congress in London shows the scope of the investigations undertaken and the earnest and systematic manner in which the industry is being covered. This association is one of the twenty-four different research bodies founded with the encouragement of the British Government and aided financially by that government to supplement the subscriptions of the 118 firms who are members. The research so far undertaken covers two fields:

1. The review of existing knowledge and its wider industrial application. The investigation of manufacturing difficulties and the selection and improvement of the products of the industry.

2. The development of new knowledge and its application to the industry.

In addition the association supports an intelligence service which collects and abstracts scientific and technical information from all available sources; in this way members are able to obtain information existing in the literature with minimum of effect and cost.

The following investigations have been taken up by the Association:

1. Copper: The effect of impurities up to 1 per cent. on its properties.
2. Brass: strip ingot casting; the surface and internal soundness of ingots.
3. Jointing of Metals: including soldering, brazing, and welding of non-ferrous materials.
4. Atmospheric Corrosion and Tarnishing of Non-Ferrous Metals.
5. The effect of Lead in Brass for Hot-Forging.
6. The Abrasion and Polishing of Metals.
7. Causes of Red Stains on Brass.
8. Oxidation of Brass.
9. Nickel Silver: mechanical properties, also season and fire cryacking.
10. Alumina in Aluminum Metal.
11. Electric melting of Non-Ferrous Metals.
12-14. Die Casting, Alloys Research.

Section 1: Brass and Bronze Alloys—at the Woolwich Research Department, under Dr. H. Moore.

Section 2: Aluminum Alloys—at the National Physical Laboratory, under Dr. W. Rosenhain.

Section 3: Low Melting-Point Alloys—Zinc, Tin, Lead, &c.—at the Sheffield University, under Professor C. H. Desch.

15. Gases in Copper Castings.
16. High-Temperature Properties of Certain Non-Ferrous Metals and Alloys.
17. Copper Locomotive Firebox Stay Rods.
18. Deterioration of Lead Cable Sheathing.
19-22. (a) Dies for Hot-Forging of Brass.
(b) Non-Ferrous Silicon Alloys.
(c) Effect of Direction of Rolling on Properties of Brass.
(d) Autogenous Welding of Copper.
23. Special Brasses and High Tensile Copper Alloys.

As in the case of many such projects some have doubted the efficiency of cooperative research on the ground that no individual member could get the personal and undivided attention which he needed for his problems. However, a glance over the above list disproves any such opinions. The problems are so general and the difficulties attacked are so widespread that everyone is interested in the results of these investigations. To the average sized company a fully equipped laboratory and adequate supervision would be far too expensive to maintain. Cooperatively, this is not only possible but immensely worth while in terms of actual financial results.

PREVENTING ACCIDENTS

If there is any one problem in American industry in particular that stands out prominently above all others it is that of Safety. We are told again and again that we are the most careless nation on earth. The prevention of accidents is being taken up in so many different ways, however, that it seems likely that our record will be improved. Safety devices of mechanical nature are being installed on the initiative of the manufacturers and under compulsion by law in most states. Workmen's compensation acts have spurred manufacturers, for strictly business reasons, if not other, to keep their plants as safe as possible to cut down accidents, thus reducing the insurance rates.

It seems that mechanical safety devices alone are insufficient. It is necessary to have in addition the spirit of safety among the workers and managers, and in order to obtain this spirit nothing but intensive and unremitting education will succeed. It has been stated by one of the most important safety directors in America that he would rather accept responsibility for acident prevention in a plant that did not have a single mechanical safety device, but where there was the spirit of safety among the workers and managers, than in a plant where there was every known physical safeguard, but not this spirit of safety. The United States Steel Corporation, the New York Edison Company and numerous others give special attention in training operating employees to the question of accident prevention. Some companies make it a prerequisite for promotion to have a thorough knowledge of the safety rules and practices of the job to which the applicant wishes to be promoted. The house organs talk safety and preach safety. Shop meetings make safety their most important topic. The subject is never allowed to rest.

An interesting fact is that the safety movement of the country has resulted (according to Arthur Williams, General Commercial Manager of the New York Edison Company) in the development of a new profession in our industrial life, in which, at the moment, there are probably no less than 5,000 men giving their entire time to this work as a life profession. He has seen large gatherings of these men, who, collectively, seemed to represent

a combination of a lawyer, a doctor, and a minister, the result of the practical constructive interest in every phase of human welfare. These men should be considered in the highest sense as elements of economy and efficiency in our industrial and commercial life, for in every instance organized safety effort, both in plant equipment and education, pays and pays handsomely.

STANDARD PRECIOUS METAL ALLOYS

A short time ago the National Jewelers Board of Trade issued a general letter to manufacturers of white gold and platinum merchandise summarizing the results of a conference held by the Good and Welfare Committee of that Board. The resolutions passed by that Board should interest everyone in these industries. They are as follows:

RESOLVED: That only one mark may be stamped on an article made of white gold and platinum, that is, the karat mark.

RESOLVED: That on articles made of white gold and platinum the tag, bill, label, etc., may state the karat fineness of the article and the word platinum, it being understood that the platinum shall not be merely electro-plated, and that the predominating metal be stated first. The term platinum must be further described by the use of a word clearly the indicating part of article that is platinum.

RESOLVED: That the recommendations made at the trade conference in regard to stamping of white gold and platinum merchandise, be accepted by this Committee in principle in determining any future action that the Committee may take on the subject of complaints, relating to the stamipng of white gold and platinum merchandise.

In taking such action the Committee trusts that insofar as the tag, label, or other descriptive device will describe the part or portion of the article that is to be platinum, the description will be complete and readily understood by the trade and the purchasing public, as well as adequately describing the exact part of the article that is composed of platinum.

As regards the subject of platinum the situation has become quite complicated in recent years. A paper by Miss C. M. Hoke before the American Chemical Society in Washington, D. C., April 24, 1924, published in this issue of THE METAL INDUSTRY, summarizes this situation, giving the main points of interest.

In New York and Chicago there exists already platinum stamping laws which state in effect that if an article is stamped or even billed as platinum the parts that look like platinum must be $\frac{925}{1000}$ platinum group metals. In other words, it is not necessary that they be platinum at all, but merely of the platinum group; a piece of palladium or iridium could be stamped "platinum."

At the time when these laws were passed this caused no difficulty since platinum was the cheapest of its group. Since then, however, platinum has risen in price considerably above palladium. As a result palladium is being used to alloy or "adulterate" platinum to such an extent that platinum jewelry is no longer platinum at all.

This obviously calls for a change in the wording of the law, but there is considerable difference of opinion about these changes.

One group wishes to permit only platinum and alloys with platinum not less than 925/1000 to be stamped as such. Their reasons are that to use a cheaper alloying material is a substitution and a deception.

Another group wishes to stimulate the palladium alloys, and their claims are that the use of palladium will replace a large amount of platinum in the arts, thus freeing it for use in science and industry; that it will cheapen platinum jewelry and bring it within the reach of more buyers; that it is more attractive (although this is open to considerable argument); that the use of palladium will also spare iridium for laboratory and industrial work.

The problem seems complicated from the outside at least. The basic fact is, however, as stated by Miss Hoke that "the flooding of the market with adulterated metal has brought about an alarming loss of integrity and moral fibre among jewelers and is probably the most important phase of the matter from the humanitarian viewpoint."

Although it is not only regrettable, but actually dangerous, that the chemist should find difficulty in obtaining platinum and iridium, this situation should not last indefinitely. Russian sources will again be opened and their mines and accumulated stores of metals will again supply the market. Industry is busily searching for lower cost metals to replace platinum and palladium and should succeed in a reasonable length of time.

A really sound and all inclusive act will have to be passed, and should be drawn without delay. Its function will be to prevent deception and at the same time preserve the precious platinum and iridium for its really most important uses, the laboratory and industry.

RECOGNIZING ABILITY

The General Electric Company has devised a new method of recognizing ability and effort among its factory employees. It consists of gathering the workers at each plant for a meeting and publicly presenting those who have done meritorious work with a sum of money and certificates acknowledging their contributions to the progress of the electrical industry. These awards are similar to the honors given by technical societies to engineers who have done outstanding work. It is claimed that this is the first time that the man in the shop has been dignified with the public recognition of his achievements.

The plan is obviously sound since it recognizes the force as an incentive of every man's desire to stand well with his neighbors. It changes the shop man's status from that of a cog in the wheel to that of an important factor in his sphere. Some men work only for money, some prefer honor; the combination is almost irresistible.

An example of the effect of such a plan is quoted in the tipless Mazda lamp. It seems that two foremen in the National Lamp Works, Louis E. Mitchell and Arthur J. White, solved the problem of removing the sharp tip from the incandescent bulb. The general conclusions drawn by the company from the records submitted for awards are as follows:

"1. A large proportion of all industrial workers, whether in the shop or in the draughting room, are working with their eyes open and their minds alert. This is particularly true, of course, in the electrical industries because the majority of the workers are skilled men.

"2. The majority of those who show initiative of a high order are men who naturally cooperate most successfully with their fellow workers. The best men do not keep their knowledge to themselves or use it only to improve their own work and position. They are willing to give and take information and work together with their associates in every way."

The plan includes many details too long to state here. It is necessary to differentiate between men in various departments and to judge the value of their contributions, to some extent, in the light of their positions. The general principle, however, seems to be such as to encourage improvement, not only within the industry but personally among the men themselves and in this way it serves a doubly useful end.

Technical Papers

Specifications for Lubricants and Liquid Fuels and Methods for Testing. Federal Specifications Board, Standard Specification Number 2c. 1924, 89 pages, 21 figures. Price 15 cents.

This paper gives United States Government standard specifications and methods of testing. Prepared by the Technical Commitee on Lubricants and Liquid Fuels of the Federal Specifications Board.

Range Boilers and Expansion Tanks.—Simplified practice Recommendation No. 8, issued by the Bureau of Standards, Department of Commerce, Washington, D. C. This is a set of standard sizes and measurements for range boilers and expansion tanks, reducing the number of sizes from 130 to 13. This pamphlet can be obtained for 5 cents from the Superintendent of Documents, Government Printing Office, Washington, D. C.

The Effect of Hydrogen-ion Concentration on the Submerged Corrosion of Steel.*. By W. G. WHITMAN, R. P. RUSSELL, AND V. J. ALTIERI.

Experiments are described wherein the rate of corrosion of steel has been quantitatively determined in solutions of hydrogen-ion concentration ranging from pH = 13 to pH = 2.7. The main factors in the corrosion of steel submerged in natural waters, dilute alkalies and dilute acids are the protectiveness of films of corrosion products and the rate of oxygen diffusion. The degree of film protection is largely determined by the pH of the solution directly adjacent to the corroding metal. Over the "natural water" field (pH 9.5 to approx. 4.5) the film protection is constant because the solution next to the metal is maintained at a constant pH of 9.5 by the solubility of ferrous hydroxide. The rate of oxygen diffusion is controlling in this region and changes in pH have no effect.

In the alkaline region (pH above 9.5) increased pH makes the liquid next to the metal more alkaline and causes the formation of a more protective film. The protectiveness of the film builds up slowly and is not readily destroyed when the alkalinity of the solution is reduced. The "critical" alkalinities of maximum corrosion reported by some previous investigators have not been substantiated. On the acid side of the "natural water" region (pH less than 4.5) hydrogen gas evolution begins when the alkalinity of the liquid next to the metal is neutralized by the acid in the main solution. Solutions of carbon dioxide are more corrosive than dilute hydrochloric acid solutions of the same hydrogen-ion concentration, due to the greater amount of total acidity.

Methods of Testing on Various Temperatures and Their Limitations.† By V. T. MALCOLM, Metallurgist, the Chapman Valve Manufacturing Company, Indian Orchard, Mass.

The author covers extensively the subject of testing at various temperatures and takes up the following in order: Historical; Early Methods of Testing; Modern Methods of Tension Testing; Impact Tests; Alternating Stress Tests; Torsion Tests; Hardness Tests; X-Ray Spectrograph; Long-Time Tests; Metallic Oxidation at Elevated Temperatures.

The effect upon the physical properties of metals of raising the temperature cannot as yet be stated in terms of a definite law. The explanation of many inconsistencies is probably to be found in the fact that the alterations in the physical properties of metals and alloys due to variations of temperature are not always of the same nature. With any increase in temperature and consequent molecular activity there may be expected a gradual falling off in tensile strength until at the melting point of the metal the tenacity becomes nothing. Allotropic changes in metals are accompanied by changes in physical properties. For instance, iron undergoes certain changes at certain temperatures. Zinc is brittle at ordinary temperatures but when heated to certain temperatures it becomes malleable and again loses this property at higher temperatures. Tin at low temperature undergoes a molecular change and falls to powder. Such changes are abnormal and except in the case of iron, very little is known as to what takes place when metals are alloyed and subjected to various temperatures.

Some metals and alloys undergo a gradual change in their crystalline character, which is greater at elevated or low temperatures. This change may be simply an increase in size of crystals or may be a change in crystalline structure. For instance, tests show that brass or bronze when heated to temperatures beyond 400° F. (205° C) becomes very treacherous, the tensile strength and elongation both decreasing as the temperature is raised, and the crystal size becoming very coarse. Alloys containing two or more constituents are more likely to suffer failure at elevated temperatures than those containing only one constituent, especially if one of the constituents is a eutectic. The eutectic often has a melting point lower than the constituent metals and therefore its strength is affected at a lower temperature; and if the eutectic forms a network or cement around the grains or crystals, its strength represents the strength of the alloy.

In these several causes of failure, the gradual change of structure occurs only after a lapse of time, and this is one reason for failure of metals or alloys that have shown good results when tested in a short time at elevated temperatures. Tests carried out on an alloy at short duration are not always sufficient to indicate the behavior of a metal in service.

Another example which may be cited is the large columnar structure often found at certain temperatures in nickel-copper alloys.

Very little appears to be known about the changes that take place in metals or alloys when subjected to high-temperature service, and it seems advisable that a complete structural study with the aid of a microscope should be made of meals when tested at various temperatures. The microscope together with the X-ray will, it is believed, be found valuable in future tests.

In summing up, it is said that in carrying out research into methods of testing metals at various temperatures, it should be the aim to carry out such tests as will approximate the trying conditions of service. This fact is often lost sight of in making an investigation. To be of any value the investigation should have a definite aim and be carefully planned. A general survey of the entire field should be made, as one method of test may be of value to a single consumer or producer, but of little or no value to others.

Thermal Expansion of Molybdenum. BY PETER HIDNERT AND W. B. GERO.

Scientific paper of the Bureau of Standards, Washington, D. C. No. 488. Expansion tests were made for various temperature ranges between room temperature and 750° C. on molybdenum ingots prepared from fine and coarse grained molybdenum powders and on samples swaged to various diameters. The results are presented in figures and tables.

Series 1 to 4 (Molybdenum Samples Swaged to Various Diameters). Some of the expansion curves on heating show marked changes in the rate of expansion at about 350° C. In most cases the plotted observations on cooling lie above the expansion curves on heating, so that after the expansion tests the specimens were longer than before these tests. For the samples prepared from fine-grained molybdenum powder the average co-efficients of expansion between 25 and 500° C. vary from 5.4×10^{-6} to 5.8×10^{-6} per degree centigrade, and for the samples prepared from coarse-grained powder the co-efficients vary from 4.7×10^{-6} to 5.7×10^{-6}.

Series 5 (Swaged and Annealed Samples) the annealing was done in hydrogen gas at 1,500° C. The co-efficients of expansion of the annealed samples of molybdenum are larger than the co-efficients of the worked specimens. Several photomicrographs showing the structural changes that occurred in the samples of this series are included.

Series 6 (Tests at High Temperatures) Forming gas was used for a neutral atmosphere in a high-teperature furnace in two expansion tests on a sample of molybdenum. The annealing incident to the first test had no appreciable effect on the co-efficients of expansion of the second test.

---

* Paper read at the meeting of the American Chemical Society, in Washington, D. C., April, 1924.

†A part of a Symposium on Effect of Temperature upon the Properties of Metals, held at a Joint Meeting of the American Society of Mechanical Engineers and American Society for Testing Materials, in Cleveland, Ohio, May 29, 1924.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE

BROWN ON BRASS

Q.—I am writing you to find out if you could give me some information regarding the best way to get a brown finish on copper-plated brass. I have tried various ways including sulphide of barium but without results. I want a brown dip that I can get various shades of brown without showing any red shades.

A.—We suggest that you try the following formulæ for brown tones upon copper-plated brass:

The acid copper deposits give the best results. Use a solution of:

Water	1 gallon
Copper Sulphate	1½ lbs.
Sulphuric Acid	4 ozs.

For the copper deposit.

Coloring Solution No. 1.

Water	1 gallon
Copper Sulphate	2 ozs.
Potassium Chlorate	½ oz.

Temp. 200° F.

No. 2.

Water	1 gallon
Copper Sulphate	4 ozs.
Single Nickel Salts	2 ozs.

Temp. 200° F.

No. 3.

Water	1 gallon
Copper Sulphate	8 ozs.
Permanganate of Potash	¼ to ½ oz.

Temp. 200° F.

The proportions given per gallon can be varied to some extent. The amounts of salts given are the minimum amounts. The scratch-brushing should be done dry.—C. H. P. Problem 3,267.

CYANIDE DIP

Q.—We notice in your June issue directions for cyanide dip, which is to be used for the elimination of after-corrosion on metal, and would appreciate your advising us if there is any danger to the workmen in using such dip continuously.

We have in mind suggesting this method for some of our large soldering flux users, if this is practical, or if you have any other suggestion to make we would appreciate same at your earliest convenience.

A.—Cyanide dips are used in almost every plating department all over the world for the removal of light oxides that result upon brass, copper or bronze, from the hot alkaline cleaning solutions, or from heat oxidation providing the oxide is not too heavy.

Cyanides are poisonous but no injury results to the user when the material is used as a dip. Many electro platers work over hot cyanide plating solutions the greater part of the time, and no injury results.

We believe you can safely advise the method. The results should be tested out first.—C. H. P. Problem 3,268.

ENGRAVING STEEL TAPE

Q.—The writer is interested in a paste formula used on engraved steel plate in taking off the printed paper transfer for use in etching steel tape lines.

The writer is aware that the following ingredients are used but desires to know if there are any more and further wishes to know the proper amount to be used; beeswax, lampblack, Venice turpentine, turpentine and rosin. Can you supply the writer with a formula which would be successful for this process?

A.—You can purchase what is commercially known as thick black printers' ink. This ink is used in connection with the transfer method.

The Scientific American Cyclopedia of Receipts and Notes and Queries—to be found in any reference library—gives information on the preparation of lithographic and transfer inks. You can probably locate this book in your city. We are unable to find a similar formula to the one you give but believe that the thick black printing ink we have referred to is made from some such formula, under lithographic inks. The following formula, among many others, is noted:

Shellac	12 ozs.
Gum Mastic in tears	8 ozs.
Venice turpentine	1 oz.

Melt together in an iron pot, then add beeswax 1 lb.; tallow 6 ozs.; when dissolved, further add hard yellow soap in shavings 6 ozs., when the whole is combined, add lamp black 4 ozs.; mix well; cool a little, then pour into molds or upon a slab and cut into square for use.

For transfer ink—tallow 8 ozs.; soap 4 ozs.; beeswax 8 ozs.; shellac 4 ozs.; lamp black 1 oz.; Venice turpentine 8 ozs.; Burgundy pitch 8 ozs. Melt together as outlined above.—C. H. P. Problem 3,269.

FINISHING BELT BUCKLES

Q.—We are sending you by today's parcel post a metal belt buckle and will thank you very much for a little information concerning the metal and finish.

We would like to know the kind of metal this is made of and where we can obtain it in lots of approximately 100 pounds to the shipment. We would want it approximately the gauge as shown by the sample or possibly a little heavier. We would also like to know about the finish, that is, how it can be obtained, etc.

A.—The basic metal from which your sample buckle, submitted to us, is made (in our opinion) of what is commercially termed 22 per cent nickel-silver. The metal can be furnished you in any quantity and gauge. After the buckles are fabricated and polished, also cleansed, they should be flashed in a silver strike solution tion of "polysulphide" or sulphuret of potassium. The solution for a minute or two, then washed in water; immersed in a solu- should be prepared as follows:

Water	1 gallon
Polysulphide	½ to 1 oz.
Ammonia Water 26°	⅛ oz.

Temp. 180° F.

Immerse the buckles in the solution until the gun metal finish is produced which requires but a moment. Wash in cold and boiling water, and dry out; repolish the surface of the buckle; cleanse if necessary. Lacquer the surface with a special nickel lacquer. This completes the operations and the results will be as your sample.

The silver strike solution should be prepared as follows:

Water	1 gallon
Sodium Cyanide, 96-98%	8 ozs.
Silver Cyanide, 80½% Silver	½ oz.
Caustic Potash	¼ oz.

Use anodes of rolled sheet nickel; maintain the silver content with silver cyanide as may be required. It must be realized that only a film of silver is required to produce the gun metal finish. Pickles for nickel silver should be prepared as follows:

Water	1 gallon
Sulphuric Acid	1 pint
Sodium Bichromate	4 ozs.

Temp. 160° F.

The usual acid bright dips used in acid dipping brass can be used for nickel silver.—C. H. P. Problem 3,270.

FLUX FOR PHOSPHOR BRONZE

Q.—We are making some split bearings of phosphor bronze and have lost some of these castings due to their being porous in the bore.

These castings weigh about 50 lb. each and are made in a green sand mold, bore up, with a dry sand core in the bore.

We are enclosing samples cut from these castings and would like to have your opinion as to what is causing this trouble.

You will note from the samples that there are three different colored holes in these two castings.

A.—We find on examination of the sample submitted segregation and oxidization and your trouble appears to be in the melting of the metal. We do not know how you are melting your metal, but the appearance of the sample would indicate the melting was done in a strong oxidizing atmosphere. It is rather hard to say just what you should do to overcome this difficulty, as we do not know the conditions. We suggest under your present practice as your metal is sick a medicine be used in the form of a deoxidizer. Your alloy appears to be approximately 10% lead, so after melting the copper, ½% of 15% phosphor copper should be added before adding the tin and lead, and stir well. Also we suggest you make an alloy of half tin and half nickel and pour in ingots and use 1% of this mixture in place of the tin. The nickel will have a tendency to set the metal quickly and stop segregation.

We are of the opinion your molding practice is not at fault. If you will look for your trouble in your metal and use the medicine as prescribed your trouble will be over.—W. J. R., Problem 3,271.

IMITATION MANGANESE BRONZE

Q.—We have been unable to obtain good castings of manganese bronze mixed from the following formula:

Copper 56, zinc 43, aluminum .25 and lead .15.

When finishing the castings they were found to be full of spots and rough pits. Can you suggest the trouble or help us in any way?

A.—We suggest in a mixture for manganese where no iron or manganese is used, and generally called imitation manganese bronze, that you use a mixture of:

58½ copper, 41 zinc, ½ aluminum.

This mixture will give very good results and will pick up from the zinc and copper approximately .15 lead, same as you desire in your mixture. In making this mixture it is necessary to get the copper good and hot before adding the zinc, then add the aluminum and stir well before pouring. It is well to take a small sample, pour a strip and see the fracture after it is broken, also the toughness of the alloy. If you will gate your casting in the regular method for manganese bronze castings, using that long run for the gate before entering the castings and suitable risers for the work, no trouble will be experienced. It is also essential to have the exact weight for this mixture, as any variation will cause trouble.—W. J. R., Problem 3,272.

REMOVING ZINC FROM BABBITT

Q.—What we desire to know is the method of removing zinc and copper from mixed scrap babbitt. If you can give us this information, it will be greatly appreciated.

A.—The proper method of removing zinc and copper from mixed scrap babbitt, is to use the sweating furnace. This is a furnace so constructed that only enough heat is applied to melt the tin, lead and antimony, which run down the incline of the furnace to the tap hole where a suitable vessel or pot receives the molten metal.

We suggest the scrap babbitt be run down and poured in slabs and placed in the sweating furnace, laying only a single slab on the hearth, that is not to place one slab on top of another. You can tell by the color if too much heat is applied. The color should be white. If a red color is running in the metal, too much heat is applied.

With a little experience you will soon learn to operate the sweating furnace to eliminate all the copper and zinc. If a small amount of copper and zinc should get through, this can be eliminated by poling or boiling the recovered metal and skimming as the copper and zinc is brought to the surface. Flux with a small amount of sulphur and sal ammoniac. In the case of metal containing zinc, sal ammoniac should be scattered on the surface; let it stand for a while before skimming.—W. J. R. Problem 3,273.

ROLLING MILL BEARINGS

Q.—We want to make some bearings to be used on rolling mills, and the mixture required is 90% copper, 4% lead, and 6% tin. We find on making these that they become very porous. These weigh approximately 150 lb. each, and are 3" thick, 10" wide, by 12" long. These are poured flat. The bearing which are now in use are made of a mixture with more tin, but with the constant operation of the machine these bearings become brittle and hard, and break. We understand that some use the above formula for their bearings, and we would like to know if you can advise us just what our trouble is, and just why we are not getting a sound casting as we are using all new ingot metal.

A.—It would be rather hard for us to say just what is wrong with your castings. It is very easy to produce spongy and porous castings, and the chief cause of such conditions is oxidized metal. The only thing we can suggest is that you use a deoxidizer. We suggest ¼ lb. of 15% phosphor copper be added to the copper just before adding the tin and lead. Also to make an alloy of half tin and half nickel and use one pound of this alloy in place of the tin. This will close the grain of your metal and have a tendency to set the mixture quicker and prevents segregation, which may be the cause of your trouble.

We suggest also you melt your copper first under charcoal and add ¼% 15% phosphor copper, then your lead, then the tin, stir well and pour at approximately 2,000 degrees Fahrenheit. Gate casting from botton and use a rather coarse grade of sand. We suggest half brass molding sand and half iron molding sand and add one shovel of pitch core compound to twenty shovels of molding sand as a facing and you should have no further difficulty with your castings.—W. J. R., Problem 3,274.

SEGREGATED BRONZE

Q.—We are sending you a sample of a bad casting. How can we overcome our trouble?

A.—We could not see anything wrong with the sample casting sent us from visual inspection. However, on breaking the casting, we find segregation and separation, and very rotten metal, which would indicate you are not melting your metal in the correct manner. If you are, we suggest that you see that your air and oil combustion is made so there is enough air to burn the oil. Do not run a smoky flame and have enough air to burn all the oil. If your furnace is making slag, your combustion is not right.

We suggest, also, to add 8 ozs. of the phosphor copper when charging the turnings. Also to charge all the copper to be charged with the borings and do not start rotating the furnace until the copper is melted.

As your casting also indicates shrinkage cracks, we think your gate is light and when this grade of metal is poured dull, shrinkage occurs. To overcome this, it will be necessary to gate your casting so the gate will get after the casting. Pour your castings at 1950 to 2000° F.

If you will follow these instructions, and have enough air to burn the oil, which should be 18 ozs. of air pressure and 20 to 40 lbs. oil pressure, and gate as stated above, very little trouble, if any, will occur from this class of metal.

Your trouble is separation and segregation; also shrinkage. This will be overcome if the instructions are followed. We suggest that you break one of your castings to see what the trouble is. Also have physical test made now and then. However, the breaking will tell you all you need, and a sample can be taken out of the furnace, poured in sand and broken after pouring.

If the metal is melted properly you will have a close, fine grain. If not, coarse crystals will appear.

If the metal shows a close, fine grain on test, your melting operation is O. K., and if you still have trouble, look to the gating of your casting.—W. J. R. Problem 3,275.

PATENTS

A REVIEW OF CURRENT PATENTS OF INTEREST

1,498,290. June 17, 1924. **Galvanizing Machine.** Harley D. Pennington, Pittsburgh, Pa., assignor to United Engineering & Foundry Company, Pittsburgh, Pa.

In a coating machine, a roll, stationary driving means spaced from said roll, and an elongated member operatively connected at one end to said driving means and at its other end to said roll, said member being adapted to be moved longitudinally to disconnect it from said roll, substantially as described.

1,498,642. June 24, 1924. **Means for Polishing Metals.** Thorvald Olsen Aalgaard, Ganddalen, Norway, assignor to Carl Larsen, Stavanger, Norway.

The herein described method of polishing metals which consists in applying to such metals a polish comprising cleaning and scouring substances and a luster imparting substance consisting of onion juice.

1,498,675. June 24, 1924. **Casting Machine.** Erwin L. Wilke, Hammond, Ind., assignor to Metal Refining Company, Hammond, Ind.

A casting machine, comprising a crucible adapted to contain molten metal, a mold, and mechanical means acting to dip the mold into the crucible for filling, moving the filled mold into a discharging position, and returning the empty mold back to the crucible for refilling.

1,498,908. June 24, 1924. **Evacuated Container.** Colin G. Fink, East Orange, N. J., assignor to General Electric Company, a Corporation of New York.

An article of manufacture comprising a vitreous body and a composite wire sealed therein, said wire having an outer sheath of cupreous metal with a thermal expansion higher than that of said vitreous body and a core of metallic material with a thermal expansion lower than that of said vitreous body, said sheath and core being united and so proportioned that the wire has a thermal expansion such as to secure a seal with said vitreous body.

1,500,261. July 8, 1924. **Sheet-Metal Spinning Machine.** George E. Page, Rochester. N. Y., assignor to Montour Aluminum Soldering Corporation, Montour Falls, N. Y.

A device of the class described for spinning a nose on a cup-shaped sheet metal article at an angle to the axis of the article, comprising in combination, a rotatable mandrel, and a work holding platform inclined to the axis of the mandrel and rotatable therewith but longitudinally movable relatively thereto.

1,500,467. July 8, 1924. **Lacquering Machine.** William H. Pond, Providence, R. I., assignor to Theodore W. Foster & Bro. Co., Providence, R. I.

In a machine of the character described, a bath tank, a work carrying rack adapted to be lowered into said tank, means for lifting the rack and its work from the bath at a predetermined speed, driving means therefor and cam means for automatically disconnecting the lifting means from the driving means when the work has been lifted clear of the bath.

1,500,954. July 8, 1924. **Manufacture of Lead Alloys.** Walter Mathesius and Han Mathesius, Charlottenburg, Germany.

An alloy containing lead as its major constituent together with smaller amounts of an alkali-forming metal and copper, such copper being added in the form of a compound thereof with an alkali-forming metal.

1,500,990. July 8, 1924. **Method of Cutting Material for Buffing Wheels.** Wesley F. Hall, Matawan, N. J., assignor to A. P. Munning & Company of New York, New York.

In the art of making buff wheels out of unit pieces cut from sheet material, the steps in the manufacture of the wheel which comprise severing a sheet of material along a series of lines parallel to one edge of the sheet, also severing the sheet along a series of parallel lines inclined to such edge, and along a further series of parallel lines inclined to both of said above-mentioned series of lines.

1,501,293. July 15, 1924. **Method of Coating Metals, Flux Therefor, Etc.** Richard Staack, North Bergen, N. J., assignor to Richard Staack Lead Coating Works, a Corporation of New Jersey.

The method of covering metal with a protective metal coating, which consists in cleansing the metal to be coated, drenching the cleansed metal with a flux containing phosphorus, and uniting with the drenched metal a protective metal in molten condition containing phosphorus.

1,501,449. July 15, 1924. **Metal-Disintegrating Apparatus.** Everett J. Hall, Passaic, N. J., assignor to Metals Disintegrating Company, Inc., New York, N. Y.

Metal disintegrating apparatus comprising a tank for molten metal, a nozzle for the molten metal immediately above and dipping into the tank, and means for entirely surrounding the stream of metal issuing from said nozzle with an annular jet of disintegrating fluid directed on converging lines upon said stream of metal as it issues from the nozzle, whereby the metal is lifted from the tank to the nozzle and disintegrated.

1,501,887. July 15, 1924. **Protected Metal and Process of Making It.** Frederick M. Crapo, Muncie, Ind., assignor to Indiana Steel & Wire Company, Muncie, Ind.

The process of zinc-coating an iron or low-carbon steel article, which consists in immersing the article in a carbonizing bath of molten salts, and subsequently applying a zinc coating.

1,501,906. July 22, 1924. **Nickel Alloy.** Noak Victor Hybinette, New York, N. Y., assignor to National Trust Company Limited, Toronto, Canada.

Carbonized nickel which is practically free from silicon.

1,501,946. July 22, 1924. **Electroplating Apparatus.** Wesley F. Hall, Matawan, N. J., assignor to A. P. Munning & Company, New York, N. Y.

An electroplating apparatus comprising a work holder for articles to be plated, a conveying mechanism adapted to move said work holder continuously along a tank, and means engaging said work holder at the delivery end of the tank for disconnecting such work holder from said conveying mechanism, and raising the work holder above the tank.

1,502,129. July 22, 1924. **Process of Melting Scrap Metal and Recovering By-Products Therefrom.** George H. Starmann and Henry Lindenberger, Chicago, Ill., assignor to U. S. Reduction Company, a Corporation of Illinois.

A method of obtaining ammonia from scrap aluminum including melting the scrap aluminum beneath a fused layer of a soluble salt, the subsequent leaching of the salt with water to dissolve the salt and simultaneously convert the aluminum nitride collected by the salt during the melting operation into aluminum hydroxide and ammonia and separating the ammonia so formed from the other materials.

1,502,144. July 22, 1924. **Compound for Brazing and Welding.** Arthur J. Knowles, Wilmington, Del.

A compound of the character described containing calcium hydroxide, alumina, aluminum, borax and potassium chlorate.

1,502,321. July 22, 1924. **Bearing Metal Alloy.** Karl Müller and Wilhelm Sander, Essen, Germany.

A bearing metal alloy comprising approximately eighty per cent of lead, the balance including antimony and tin in amounts not less than ten per cent and five per cent respectively, and approximately 0.5 per cent of phosphorus.

1,502,425. July 22, 1924. **Hardening Alloy for Bearing Metals and Process of Using Same.** Robert Hughes Evans, Detroit, Mich.

As a distinct composition of matter a hardening alloy for bearing metals consisting of the following ingredients mixed in substantially the proportions by weight here indicated, to wit:

	Parts
Antimony	70
Tin	25
Copper	3
Bismuth	2

EQUIPMENT

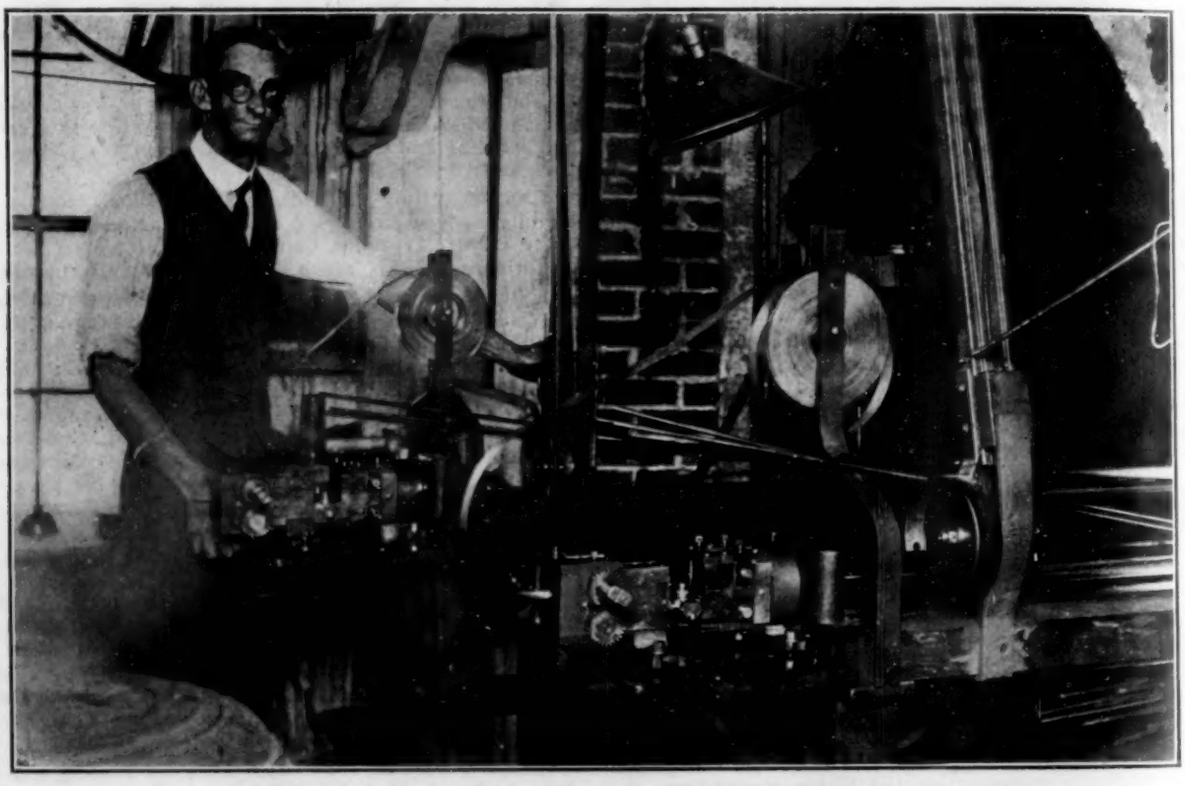
NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST

New Lock-Joint Brass Tubes

William Jaquiery, of 17 Edgewood avenue, Waterbury, Conn., has developed a method for making lock-joint brass tubes, which he says will enable him to make them at half the cost of seamless tubes and at less than the cost of brazed tubes. For all practical purposes, the tubes are the equal of seamless tubes as they are absolutely air and water tight and can stand as much pressure as seamless tubes are ever put to, he says.

The tubes have been tested in the Yale laboratory and those one-quarter inch in diameter stood a pressure of 600 pounds, five-sixteenths tubes stood a pressure of 650 pounds and three-eighths tubes stood 700 pounds pressure. At present the tubes he is making are in small sizes, from seven-sixteenths of an inch to five thirty-seconds of an inch in diameter but he can make them in larger sizes, he states.

A strip of brass is fed into the machine from an ordinary reel of sheet brass. Small wheels bend the strip into a "U." As it proceeds, other wheels bend each edge of the "U" back in the same direction, close against the sides of the "U." That is, the edge of the right-hand side of the "U" is bent back almost parallel with the edge. The edge of the left side of the "U" is bent also to the right, being bent back inside the "U" nearly parallel with the sides. As the strip proceeds through the machine the right-hand bent edge is caught under the left-hand bent edge and the two are locked together by the pressure exerted as the now formed tube is passed through a die. The tube then passes through another die which reduces it and it comes out on an ordinary draw bench where it is caught by the automatic pulley of the bench and re-drawn.



WILLIAM JAQUIERY AND HIS TUBE MACHINE

Mr. Jaquiery is both a toolmaker and a tubemaker. If he had not had experience in both trades he could not have evolved the machines for making lock-joint tubes successfully, he says. He states that lock joint tubes have been made before but not successfully because they could not be made air and water tight. The reason is that the machines for making them were designed either by toolmakers or tubemakers, not by one man who was both. As any tubemaker knows, in drawing tubes, they must be pinched just right or they will buckle and be distorted in shape. Machines for making tubes, designed by toolmakers, consequently, have often been faulty because the makers did not realize the precision incident upon tube drawing.

Mr. Jaquiery evolved his machine after two years experimenting and practice. It forms the tube from a sheet of brass, locks it and also draws it down to smaller sizes in one operation. He has taken out 17 separate patents on different parts of the machine, patenting every possible device used in connection with his process so that any further patents would have prevented even the manufacture of stovepipes.

The tubes can be re-drawn to any size. Mr. Jaquiery says this feature is something lacking in any machines designed before for making lock-joint tubes. No solder or welding compound is used nor are the tubes subjected to any heat. Previously, all lock-joint tubes had to be soldered, Mr. Jaquiery states.

Mr. Jaquiery is making tubes for radiators for automobile and airplane motors and for pianolas, bending them for the latter purpose. His lock joint tubes are superior to seamless tubes for this purpose, he claims, as thin seamless tubes when bent as required for pianolas are inclined to wrinkle at the bent part. The lock joint tubes will not wrinkle at the bent part as the "lock" is on the inner part of the "bend" and imparts rigidity to it. The "lock" or seam consists of four thicknesses of metal, the thickness consisting of the two bent edges caught together—one edge caught under the other—and in addition, a portion of the two sides of the tube.

The draw benches are automatically operated, two of his tube forming machines being operated in conjunction with one bench so that he can draw tubes at the rate of 25 feet a minute.

WALLACE IMPROVED COMBINATION ANGLE AND EYE BENDING MACHINE

The illustrations show the machine with two die set-ups. The one at the left shows the manner in which the dies are arranged for the bending of small rods or flats around a forming pin. This set-up is suitable not only for the forming of offset or centered eyes, but also for making hinge shaped eyes, hooks, "S" and "U" shapes, etc.; also for angle bends of various degrees if a slight radius is wanted at the point of bending.

The stationary back die is held by a clamp on a supporting bracket on the outer edge of the machine and the holder for the grip-dog is near the outer edge of the rotating table in order to admit of forming pins being used as large as 2½" diameter so that an eye 2½" diameter or less may be turned on the end of a rod or wire, or a bend made that would have a radius of 1¼" or less, according to the size of forming pin placed in the machine. Forming pins can be easily removed, and changes from one size to another can, therefore, be quickly made.

If larger eyes than 2½" inside diameter, or radius bends or more than 1¼", are wanted, they can be obtained by the use of special tool equipment which we are prepared to furnish at additional cost.

The illustration at the right shows the machine set up for making sharp right-angle or obtuse-angle bends. As you will note, the stationary back die is simply reversed, and the tool holder instead of having a gripping blade (as required for eye bending) now has a rectangular die, and in place of the forming pin a front "angle-die" is fastened to the rotating table by means of a dowel pin and a cap screw. With the machine thus equipped bends may be made in flats, rounds, or squares of any number of degrees to 90, or more, if necessary, by the use of special dies. Box bends, offset bends, sharp angle, and "U" bends can easily be made with this die set-up.

There is a movable gauge at the left-hand side of the machine for gauging the stock that is to be bent, and also a moveable stop-block which can be clamped to the edge of the machine, against which the operating handle will fetch up, which acts as a gauge for the number of degrees of the bend that may be wanted.

By pulling the handle it moves the rotating table with the dies. The stock is held between the dies on the rotating table, and as they move around the extended end of the stock is forced against the stationary back die.

In the case of the set-up for the eye bending, the blade or "grip-dog" is pointed so as to engage the rod as soon as the table starts to rotate, and on account of the bending pressure that is brought to bear on the rod it is thus easily held and pulled around the forming pin without danger of slippage. This blade, or grip-dog, may be adjusted to suit any thickness of

WALLACE BENDING MACHINE

material within the capacity of the machine by loosening a nut on the under side of the clamp that holds the same, and then setting the grip-dog to suit the job.

By the use of special equipment, which we can furnish at extra cost, this machine may also be adapted for the bending of light flat stock on edge to a radius equal to one-half times the width of the material—radius to be measured from the center of circle to the near edge of the material.

The machine is furnished complete with pedestal and one set of tools for bending eyes and one set of tools for making angle bends. One forming pin of any size is furnished with each machine; additional forming pins to order at slight additional expense.

Capacity: 5/16" (or less) square or round wire or rod, without heating.
3/16" x 1" (or less) flat stock, or equivalent, without heating.

The net weight, including stand, is 180 pounds.

This machine is made by the Wallace Supplies Manufacturing Company, 1312 Diversey Parkway, Chicago, Ill.

WORM BOX

The W. A. Jones Foundry and Machine Company, Chicago, Ill., has just placed on the market a new product, the "Jones Double Thrust Worm Box." This box provides an accurate and rigid support for the worm shaft and holds a liberal supply of oil in which the worm operates. There are also provided finished thrust washers at both ends of the worm consisting of two steel and the center one of hard fibre. The bearings are

JONES DOUBLE THRUST WORM BOX

babbitted and bored also faced on ends. These boxes are now made in standard sizes to suit standard cut steel worms as made by this company, and both the boxes and gears are covered by their new catalog No. 29, entitled "Jones Gears" which is just off the press.

These boxes are recommended to be used with open worm gear drives when something less expensive than a completely enclosed unit must be used.

PANGBORN EXHIBIT

The Pangborn Corporation, Hagerstown, Md., will have a complete exhibit at the American Foundrymen's Association Convention, October 11-17th, Milwaukee, Wisconsin.

They will be located in Mechanics Hall, spaces 16, 17, 18, 19, 30, 31, 32 and 33, a total floor space of 1,540 square feet.

Exhibit will include sand-blast equipment in operation cleaning castings, etc., showing actual results and accomplishments. Also dust exhauster-arrester equipment in operation. A complete line of the steel abrasives will be shown and their use and advantages demonstrated. An interesting feature will be an exhibit of representative and interesting castings from well known foundries.

Representatives in attendance will be as follows:

Thomas W. Pangborn, President; John C. Pangborn, Vice-President; H. D. Gates, Sales Manager in charge of exhibit; P. J. Potter, Works Manager.

NEW POTASH MOP

A new style mop, with a curved handle, is a double duty article in that it is particularly adapted for mopping the inside of cup-shaped articles, pitchers, urns, reflectors and other irregular surfaces, where the old style straight handle mop cannot be used to advantage. It is also applicable in all cases where it has been customary to use the straight mop.

These mops are hand made wire drawn, of first quality, heavy cotton wick, closely tufted, making a firm and durable working body, and are said to be cheaper and better than the straight handle mop. They are made by the Hanson & Van Winkle Company, New York.

PLATING BARRELS

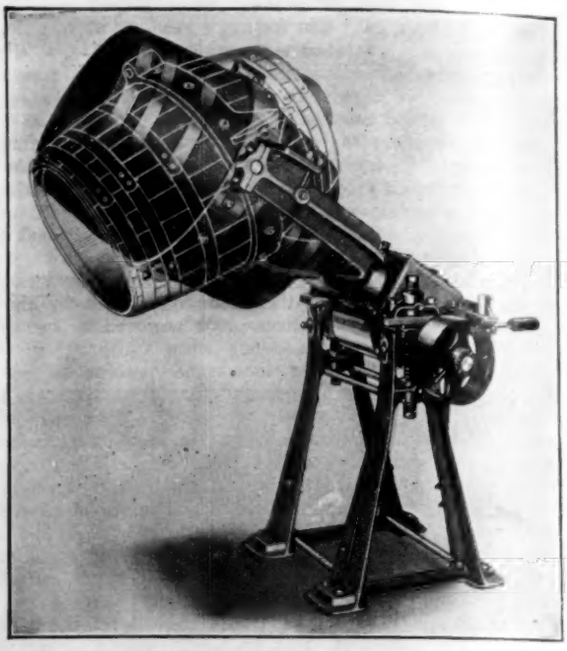
Within the last few years, plating barrels have been very extensively introduced, and great improvements have been made in their construction. In former years the plating barrel was often poorly built; its mechanical and electrical faults considerably decreased its usefulness and led to frequent repairs. High grade plating barrels, such as are now manufactured, are much stronger, simpler in construction, more reliable in operation, and more durable.

An important advance is the considerable reduction in electrical and mechanical losses. This reduction gives both increased efficiency and less danger of breakdowns. In recent years the special design of plating barrels for particular classes of work, has become a highly important feature of engineering, owing to the many novel applications for which this class of machinery is now used.

The usual action is to plate and polish at the same time, but in The Daniels Plating Machine, made by The Daniels & Orben Company of 81 Walker street, New York City, and Newark, N. J., the barrel is of wood, and contains the anodes, perforated cylinder, cathode contacts, and solution. The work to be plated is placed into the perforated cylinder, the machine is driven by a clutch pulley, mounted on a shaft, with worm and worm gear to drive barrel. The barrel is started and stopped by throwing in and out the clutch lever. This lever also opens and closes the electrical circuit, thus preventing the work from burning when the barrel is idle.

The operating mechanism and electrical conductors are free of the solution, which prevents the waste of metal deposited by short circuits and means high efficiency. One outstanding advantage of the tilting machine, is that the operator can keep a close watch on the work and take out samples for inspection from time to time, without stopping the machine. This type of machine can be filled and emptied by tilting the barrel while the machine is idle. These machines can be used for a greater range of work than the other types, but usually not for parts over six inches in length.

The Daniels & Orben Company also carries a complete line of plating and polishing supplies at the New York address.



DANIELS PLATING MACHINE

NEW EUREKA SPRAYER

The Eureka Pneumatic Spray Company, Inc., of 87-28 130th street, Richmond Hill, Long Island, N. Y., announced a new sprayer, known as the "Paragon" model, which is claimed to be all that the name implies.

The inventor, W. J. Smart, is the pioneer of the sprayer industry. The well known line of Eureka sprayers have been popular with users for over twenty-six years, but it is claimed that there are numerous distinctive features in this new Paragon model, in which every point of previous models which could be simplified or improved, condensed and made more readily accessible, has been improved.

EUREKA "PARAGON" SPRAYER

A feature of this sprayer is that the portion which conveys the fluid, may be readily separated from that portion which has to do with the air only, greatly facilitating cleaning, and in the case where sprayers are immersed or soaked, and where the paint, lacquer, varnish or other solutions, saturated in the thinner, would get into the air portions, causing air valve trouble and general stoppage, this cannot occur. No tools are required to dismember it. In fact so simple an instrument as an ordinary ten-cent piece, is all that is needed merely to loosen four set screws which hold the air valve in position, permitting all air parts to be withdrawn from the fluid members.

The other portions are so made as to slip together, or engage by slots and hooks. The ground valve has been eliminated. Exhaustive experiments with alloys have produced a valve seat metal impervious to potash and cleaning solutions, and it is stated, pure acid.

The gun is light, compact, comfortable in the hand, does not cramp the wrist or cause finger numbness. A small or large conical spray may be had as desired, also a wide flat spray, of even density.

The Eureka Company also announces a reduction in prices on the regular No. 13 Eureka sprayer, ½ pint size, of which may now be had for $8.00; and the pint size with glass container at $9.00.

NEW TANK LINING

An inexpensive material has been developed by the Callender Soldering Process Company, 12 So. Jefferson street, Chicago, Ill., for lining acid tanks. It is claimed that this composition called "Rubberline," when applied to acid vats, plating tanks, etc., will resist acids permanently.

The product does not crack; tanks can be shipped with the assurance that they will reach their destination intact and still be in an acid proof condition. It is not affected by heat or freezing; it does not lop over or run down during the hot season nor does it become brittle in the cold weather. The composition is said to have been used and tested over a period of four years.

EQUIPMENT AND SUPPLY CATALOGUES

Norton Floors—An illustrated booklet showing where Alundum floors may be used, issued by Norton Company, Worcester, Mass.

Year Book American Engineering Standards Committee—1924, issued by American Engineering Standards Committee, 29 West 39th street, New York City.

"Jones Gears"—Catalog No. 29, issued by W. A. Jones Foundry and Machine Company, 4401 W. Roosevelt Road, Chicago, Ill., illustrating and describing, giant gears; spur gear speed reducers; enclosed worm gear drives; gears made from cast iron, cast steel, forgings, rawhide, bakelite. Teeth cut or molded; spur, bevel, worm.

Kenworthy Non-Oxidizing Annealing Furnaces—Bulletin No. 91. An illustrated folder on the different types of Kenworthy furnaces. Issued by Charles F. Kenworthy, Inc., Waterbury, Conn.

Kenworthy Car Type Non-Oxidizing Annealing Furnaces is the title of Bulletin No. 93, issued by Charles F. Kenworthy, Inc., Waterbury, Conn.

Maximus Polishing Wheels—A folder issued by Crown Rheostat and Supply Company, 1910 Park avenue, Chicago, Ill., on its different types of Maximus wheels.

"The Stormoguide"—A booklet issued by the Taylor Instrument Companies, Rochester, New York, illustrating the "Stormoguide," a simplified weather forecaster—a vertiable clock of the air.

Liquid Sulphur—A folder on Liquid Sulphur for oxidizing builders' hardware, etc. Issued by Sulphur Products Company, Greensburg, Pa.

Engineering Foundation—Report for the year ended February 14, 1924, ninth year, publication No. 8. Issued by the Engineering Foundation, Engineering Societies' building, 29 West 39th street, New York City.

Lime Compositions—A folder issued by Frederic B. Stevens, Inc., Detroit, Mich., on Stevens Union Maid White Polish for polishing nickel, giving it the lustre of silver, and Stevens White Rose Buffing Composition for either nickel or brass.

"The Chicago Line"—A folder illustrating and describing ball bearing loose pulleys and power appliances known as "The Chicago Line." The folder also contains a price list. Issued by Crown Rheostat & Supply Company, 1910 Park avenue, Chicago, Ill.

Norton Refractories—A booklet illustrating and describing Norton refractories for heavy duty, their selection, use and properties. Issued by the Norton Company, Worcester, Mass.

Frederic B. Stevens, Detroit, Mich., has issued a folder entitled "80% Ferro-Manganese."

"Good-All"—A folder issued by Goodall Electric Manufacturing Company, Ogallala, Neb., describing and illustrating the Goodall electric soldering machine.

"Carbon Brushes—Their Selection and Application"—A booklet issued by the Corliss Carbon Company, Bradford, Pa., giving some instructive information regarding the selection and application of metal-graphite brushes to plating generators.

ASSOCIATIONS and SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

BRITISH INSTITUTE OF METALS

Headquarters, 36, Victoria Street, London, England

AUTUMN MEETING, LONDON, SEPTEMBER 8 TO 11, 1924

The following papers are expected to be submitted:—

1. Anderson, Robert J., B.S. (Boston, Mass., U. S. A.), and Everett G. Fahlman, B.S. (Cleveland, O., U. S. A.). "A Method for Measuring Internal Stress in Brass Tubes."
2. Andrews, D. H., and Professor John Johnston, D.Sc. (New Haven, Conn., U. S. A.). "The Application of the Ideal Solubility Curve to the Interpretation of Equilibrium Diagrams in Metal Systems."
3. Bengough, Guy D., M.A., D.Sc. and R. May, A.R.S.M. (London). "Seventh Report to the Corrosion Research Committee of the Institute of Metals."
4. Dix, E. H., Jr., M.E., M.M.E. and Lieut. A. J. Lyon, B.S. (Dayton, O., U. S. A.). "Comparative Results on Copper-Silicon-Aluminum and Other Aluminum Alloys as Obtained on Separately Cast Specimens and Specimens cut from a Crankcase Casting."
5. Fairlie, D. M., M.Sc. and G. B. Brook, F.I.C. (Kinlochleven). "The Determination of Sodium in Aluminum."
6. Genders, R., M.B.E., B.Met., F.I.C. (Woolwich). "The Extrusion of Brass Rod by the Inverted Process."
7. Hanson, D., D.Sc. and Grace W. Ford, B.Sc. (Teddington). "Investigation of the Effects of Impurities on Copper. Part II.—The Effect of Iron on Copper."
8. Ingall, Douglas H., M.Sc. (Wednesbury). "The Relationship between Tensile Strength, Temperature and Cold-Work in Some Pure Metals and Single Solid Solutions."
9. Moore, H., O.B.E., D.Sc. Ph.D. (Woolwich). "On the Effect of Progressive Cold-Rolling on the Brinell Hardness of Copper."
10. Rose, Sir Thomas K., D.Sc., A.R.S.M. and J. H. Watson, M.C., B.Sc., A.R.S.M. (London). "Experiments on the Working of Nickel for Coinage."
11. Rowe, Francis W., B.Sc. (Manchester). "Some Experiments on the Effect of Casting Temperature and Heat-Treatment on the Physical Properties of a High-Tin Bronze."
12. Rowe, Francis W., B.Sc. (Manchester). "Some Experiments on the Influence of Casting Temperature and Mass on the Physical Properties of Admiralty Gun-Metal."
13. Tanabe, Tomojiro (Osaka, Japan). "Studies in the Aluminum-Zinc System."
14. Turner, T. Henry, M.Sc. and W. E. Ballard (Birmingham). "Metal Spraying and Sprayed Metal."

AMERICAN ELECTRO-PLATERS' SOCIETY

PHILADELPHIA BRANCH

Headquarters, Care of Philip Uhl, 3432 N. 29th St.

Philadelphia branch held its summer meeting and picnic at Willow Grove Park on Saturday, August 9, 1924. The meeting part of the programme was dispensed with on account of the hot weather, so the picnic and amusements held full sway and were a great success, as the prizes for the ladies and the kiddies were the best to be had, and all were highly pleased. The committee in charge are to be congratulated for the fine assortment of prizes awarded and the grand showing made. It is to be hoped that those members who did not attend this year will be able to attend next year and not miss the fun that was had this year.

The regular monthly meetings will be held on the first Friday of each month, commencing on Friday, September 5, 1924. It will be best for all the members to start right in and make up their minds not to miss any of the meetings, thereby getting the full benefit of the lectures.

In what better way could any plater spend two hours a month, than by meeting his fellow artisans in a place of learning such as the members of the Philadelphia branch have, and discussing various ways of taking care of his solutions and also developing new methods and finishes? Let all get together and make this the best year the Philadelphia branch has ever had. By doing so it will also be the best year for all individually.

INDIANAPOLIS EXPOSITION

Headquarters, care of Briant Sando, 503 Chamber of Commerce Building

The city of Indianapolis is entering enthusiastically on plans for a great Indianapolis Industrial Exposition, October 4 to 11, which will emphasize the extent and diversified character of industrial activity in Indianapolis, already an outstanding feature of the city's industrial development.

The coming exposition will be the second undertaken by the industries of Indianapolis. The first was held in the fall of 1921, and drew enormous crowds from all parts of the state. The 1921 exposition, like the one which is to open in October, was of a purely civic character, and part of a comprehensive plan of the Indianapolis Chamber of Commerce for community advertising and development.

Indianapolis already has established a reputation for the unusual range of industry centered in it. Of the city's total number of separate manufacturing concerns, numbering slightly over 1,000, and producing 1,200 distinct articles, probably one-half will be represented in the exposition.

Among the leading industries of Indianapolis, in the value of yearly output, are automobiles, and automobile accessories, the packing industry, metal trades, clothing food products, furniture and pharmaceuticals. All of these, and a very large number of other important industries are supporting the exposition, and among the manufacturers there is an overwhelming attitude of approval for the general exposition idea, which has behind it the encouragement of local interest in the progress of the city, the development of loyalty to the community and faith in its future, and probably more important than any other one thing, the fostering of a spirit of unity and co-operation among the manufacturers themselves.

CHEMICAL EXPOSITION

Owing to some confusion which is believed to exist in a few quarters regarding the holding of the next chemical exposition, an announcement has been sent out by the International Exposition Company, under whose management the Exposition of Chemical Industries has been held since 1915. Numerous inquiries have been received by the management which lead it to believe that many interested parties are of the opinion that there will be a chemical exposition this year. This is not the case. There will be no chemical exposition in 1924, the next Exposition of Chemical Industries will be held September 28th to October 3rd, 1925, at the Grand Central Palace, New York.

Personals

PAUL D. MERICA

Paul D. Merica was born in Indiana and received most of his early education there, attending De Pauw University, graduating later however from the University of Wisconsin, receiving his degree in Chemistry.

After an additional year in the physics department of this university he received an invitation from the government of the Province of Chekiang, China, to teach chemistry at the Provincial College of this province. This was accepted and he spent two years at Hang Chow, China, engaged in the interesting occupation of introducing our Western civilization among the Chinese. It may be added that he had excellent opportunity at this time to realize the remarkable ability of the educated class of Chinese in Western arts and their future potentialities when their interest is really aroused.

PAUL D. MERICA

Leaving this interesting oriental civilization rather reluctantly Mr. Merica in 1911 went to Berlin, primarily to take up again his chemical and physical studies, first at the Chemical Institute of Professor Emil Fischer and later at the Technische Hochschule at Charlottenberg. It was there that he first became definitely interested in metallurgy through his work in the metallographic laboratories of Professor H. Hanemann, where he remained until 1914, taking finally his Ph. D. in chemistry and metallurgy. It was just about six months before the opening of the war that he returned, after a five years' absence, to this country to engage in metallurgical research work.

After a few months spent at the Engineering Experimental Station of the University of Illinois on a special research on the embrittlement of boiler steel in association with Professor S. W. Parr, Dr. Merica joined the metallurgical staff of the U. S. Bureau of Standards under its then chief, Dr. G. K. Burgess.

At the Bureau attention was engaged perhaps predominantly in non-ferrous metals, particularly wrought brass and aluminum alloys. During the years 1914-1916 much attention was given by the Bureau of Standards to certain failures of brasses and bronzes in the construction of the Catskill Aqueduct and Dr. Merica in collaboration with others conducted several investigations into the matter, publishing later a number of papers on the subject. Subsequently, during the period of our entry into the war the production of high strength light aluminum alloys in this country became a matter of considerable importance, and he had charge at the Bureau of Standards of the investigational work along these lines. This resulted, among other things, in the determination of the nature and mechanism of the heat-treatment of aluminum alloys of the Duralumin type and the improvement of the technique of heat treatment of these alloys. At this time Dr. Merica was assistant Chief of the Metallurgical Division of the Bureau of Standards.

In 1919 Dr. Merica left the Bureau of Standards to associate himself with The International Nickel Company at its Orford plant, where he later became Superintendent of Research. In 1922 a new department of this company was organized, the Development and Research Department, for the purpose of developing new commercial uses for nickel and new nickel products. Dr. Merica became associated with this department and at present is Director of Research for The International Nickel Company, in New York City and assistant manager of its Development and Research Department.

Joseph D. Rogers, general sales manager of the Art Metal Construction Company, Jamestown, N. Y., is at present in Europe on a business trip for the company.

Fred Cowen is now associated with the Werner R. Thompson Company, Detroit, Mich., having formerly been with the Osborn Manufacturing Company, Cleveland. Mr. Cowen is the newly elected treasurer of the Detroit Foundrymen's Association.

Raymond H. Sullivan, joined the North & Judd Manufacturing Company, New Britain, Conn., eighteen months ago, and has been elected to a vice-presidency recently. He was formerly with Yale & Towne Manufacturing Company, at Stamford, where he was superintendent of methods.

A. J. Jupp, vice-president Lunkenheimer Company, Cincinnati, Ohio, attended the world power conference. He presented the valve and pipe-fittings industry of the United States at the conference, which is to consider how the industrial and scientific resources of power may be adjusted nationally and internationally by a study of the resources of each country.

Thomas B. Myers has been elected a member of the board of directors of the Manufacturers' National Bank of Racine. He is vice-president and general manager of the Hamilton-Beach Manufacturing Company, Racine, Wis., and also assistant secretary of the Scovill Manufacturing Company.

Nelson Littell, who was assistant examiner in charge of metal founding in the Metallurgical and Chemical Division of the United States Patent Office for several years, has recently become a member of the firm of Hammond & Littell, patent lawyers, 110 E. 42nd street, New York.

A. G. Meaden has been elected a director and general supervisor of the Canadian Bronze, Ltd., Montreal Canada. Mr. Meaden was for many years general superintendent of the Northwestern Brass Company, Winnipeg. The St. Thomas Brass Company, St. Thomas, Ont., and the Northwestern Brass Company, Winnipeg and Calgary, are subsidiaries of Canadian Bronze, Ltd. Mr. Meaden is still hale and hearty after 48 years in the brass foundry business.

Charles Ferry, vice-president in charge of copper sales of the Nichols Copper Company since 1919, has been elected a director of that company, to succeed Dr. John B. F. Herreshoff, resigned. Mr. Ferry was formerly with the Bridgeport Brass Company, of Bridgeport, Conn. Dr. Herreshoff has been with the Nichols Company since its organization in 1905, and with the Nichols Refinery since early in the 90's. He has been elected honorary vice-president.

H. L. Woolfenden has joined the Scott Valve Manufacturing Company, of Detroit, Michigan, and will have charge of sales promotion. Mr. Woolfenden is a graduate mechanical and electrical engineer, having received both degrees from the University of Michigan. After several years spent as a consulting engineer in Detroit, he went to Denver in 1901 and engaged in engineering and contracting. Later becoming associated with the Allis-Chalmers Manufacturing Company, Mr. Woolfenden, while district manager at Denver, had charge of all work in the Rocky Mountain District.

Philip H. Morningstar, for four years superintendent of the finishing department of the K & O Company, of Brooklyn, N. Y., novelty manufacturers, has resigned his position to go with Maas & Waldstein, lacquer manufacturers. He will join Harry Flanigan's sales force and make the New York office his headqarters. Mr. Morningstar has been in the plating business for twenty-four years. He has been one of the most active members of the New York branch, and has held all of the offices connected with it, including that of president. He will continue to be active in the work of the American Electro-Platers' Society.

Dr. Ancel St. John will open offices as a consulting and research physicist, specializing in the industrial application of X-rays, having resigned from the staff of the Union Carbide & Carbon Research Laboratories, Inc., Long Island City, N. Y. Dr. St. John has been associated as research physicist with the Long Island City laboratories since their opening, and previously was connected with a predecessor group, the Research Laboratories of the National Carbon Company, Inc., Cleveland, Ohio. He has devoted himself during this period almost exclusively to the application of X-rays in the carbon and metallurgical industries. For the present, Dr. St. John's mail address is Room 404, 505 Fifth avenue, New York.

Deaths

CAPTAIN HARRY GEORGE

Captain Harry George, U. S. N. (retired), died on Monday, July 21, at 7 p. m., at the Naval Hospital, Brooklyn, N. Y., and was buried with military honors at 11 o'clock on Thursday, July 24, in the National Cemetery at Arlington, Washington.

Captain George came to Waterbury and joined the technical staff of The Chase Companies, Inc., in April, 1916. While he had no previous practical experience in the making of brass his very remarkable ability and enthusiasm resulted in his becoming one of the country's best informed men on practical as well as the theoretical problems of brass manufacture.

Captain George was born in 1863 in Cardiff, Wales. He entered Annapolis, being appointed from Michigan, at the age of fourteen, though the limit was supposed to be even in those days fifteen. He graduated in 1883, one of the youngest men ever graduating, and in spite of this he was one of the three star men at the head of his class.

In 1905 he commanded the Naval Battalion that acted as escort for the body of Captain John Paul Jones when it was brought back from France, and on that occasion he was made a commander of the Legion of Honor.

He reached the position of captain in the United States Navy and retired in 1909, when there was a surplus of officers and little activity in the service.

When, however, this country entered the World War, he again offered his services and was made commandant of the Mare Island Navy Yard, California. This position he occupied with great ability and was given the Navy Cross for merit. Records were made in the building of destroyers and generally in meeting the war demands made on that important naval station. On completion of the war he applied for release and came back to his work in the Chase Companies.

He not only helped in the practical problems of the Chase Metal Works, in connection with the improvement of production facilities such as electric castings furnaces and in various other directions, but devoted himself especially to assisting the company's customers and friends in solving their special technical problems. This he did with very great success and to their entire satisfaction.

In addition to the work he did directly for the Chase Companies at their request he devoted a very considerable amount of his time since the organization of the Copper and Brass Research Association to assisting it in its wider field and made various special reports for its benefit and that of the industry as a whole.

It was while on one of these trips, inspecting a locomotive specially equipped with copper tubing and firebox that he contracted a cold which developed into influenza. Over-exertion in a blizzard during the firing test of this locomotive resulted in straining his heart. He spent some weeks at St. Joseph's Hospital, Dickinson, North Dakota, until he was able to come on to the Naval Hospital in Brooklyn.

CAPTAIN HARRY GEORGE

He seemed to be gradually improving and friends who saw him until within two or three hours of his death thought that he was distinctly better than he had been. A sudden reaction occurred, however, and he died very unexpectedly from heart failure.

Few men have the diversity of interest, the fund of experience, or the punch of personality Captain George had. Whoever met him remembered him as a magnetic, interesting man, even without taking into account his technical information and expert knowledge. From the very start of his naval career he was selected for many special duties and assignments; plotting, charting, researches and investigations both ashore and on special cruises. He was detailed to the preliminary Alaska survey and for the astronomical work in connection with the Mexican survey. Later he participated in the early investigations looking toward electrification of the Navy, and for three years he was with the early torpedo flotilla on the Atlantic Coast.

In 1909 he left active service in the Navy and with his pack on his back spent a number of years in Alaska prospecting mining, helping to fund and administer the one-time City of Golden and paying his way from time to time by handling an engineering problem, building a stretch of railroad, a wharf or a mill.

Captain George was a unique and rare character, always in perfect physical condition, with an extraordinarily keen mind and remarkable memory, enthusiastically loving life in the open, a lover of children, and devoted to his friends, who were in turn most devoted to him and by whom he will be greatly missed. He is survived by his widow and a daughter, Elizabeth McCalla George.

SIR GEORGE T. BEILBY

Sir George T. Beilby, who died in London this month, at the age of 73, was President of the Institute of Metals from March 1916 to March 1918. He was knighted in 1916. Among the many instances of his interest in metallurgical research was his gift to the Institute in 1912 of the Beilby Research Prize for work on "The Solidification of Metals from the Molten State." This resulted in a long and important research carried out under the direction of Dr. Cecil H. Desch, now Professor of Metallurgy at Sheffield University. Sir George, who was the son of an Edinburgh physician, was well known both in this country and elsewhere as a scientific director of technical works and as the inventor of a number of technical processes. At the time of his death he was Chairman of the Cassel Cyanide Company, Glasgow. He was a Fellow of the Royal Society. In 1899 he was President of the Society of Chemical Industry and from 1908 to 1912 President of the Institute of Chemistry. At the South African Meeting of the British Association for the Advancement of Science he presided over the Chemical section. He assisted in important investigations on fuel economy as a member of the Advisory Council on Scientific and Industrial Research, the Royal Commission on fuel and engines for the navy and of other public research bodies.—G.

HARRY W. BENSON

Harry W. Benson, only son of H. K. Benson died very unexpectedly early in August at 55 years of age. He had entered business with H. K. & F. S. Benson in Glen Ridge, N. J., some thirty-five years ago, and at the time of his death was Treasurer of the Benson Rolling Mills, Inc., which succeeded H. K. & F. S. Benson in 1923. Mr. Benson leaves a widow and a daughter. His father now past 80 years of age also survives him, though no longer active in business.

HERMAN O. SCHMARR

Herman O. Schmarr, 48, one of the best known German residents of New Britain, Conn., died at his home at 51 Harrison street, after a long illness. He was a native and long-life resident of this city and had a wide circle of friends. He was engaged in business for a number of years, retiring several years ago. Mr. Schmarr was a director of the Bristol Brass Company and the Mutual Finance Company. He was a member of numerous societies, and was an enthusiastic bowler. Mr. Schmarr leaves a wife, Mrs. Mary Anderson Schmarr; a sister, Mrs. Bertha Schmarr Larson, and a brother, Otto Schmarr.

ROBERT C. COLTER

Robert C. Colter, general auditor of the Zenite Metal Company of Indianapolis, was killed recently in Asheville, N. C., when he was thrown from a horse while riding on a mountain trail. He had been staying at a mountain inn for his health. He was 48 years old and had been connected with the Zenite Metal Company about five years. He left Indianapolis January 1 for a vacation, and made a remarkable recovery of his health in North Carolina, returning to Indianapolis in April. In the hope of further recovering his health he left again about June 15. He is a relative of Herbert R. Duckwall, president of the Zenite Metal Company.

CONRAD C. ARENSBURG

Conrad C. Arensburg, president and one of the organizers of the McCullough-Dalzell Crucible Company, Pittsburgh, Pa., died at his home in that city on July 18, following an illness of several weeks. Mr. Arensburg was born in Pittsburgh 84 years ago. He was a Civil War veteran, having enlisted at the outbreak of the conflict, and serving until severely wounded at Boonsboro, Md., shortly after the Battle of Gettysburg.

H. S. BROCKWAY

Harry S. Brockway, superintendent of the plating department of the Ford Motor Company for the last 10 years, died at his home, 704 Sheridan avenue, June 9, 1924. He was 62 years old and a Detroit resident 18 years. Mr. Brockway was a member of Moslem Temple, Mystic Shrine, and of the Electroplaters' Association. His widow, Edna M., and two children survive.

NEWS OF THE INDUSTRY

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS

NEW ENGLAND STATES

WATERBURY, CONN.

SEPTEMBER 2, 1924

Last month the **Blake & Johnson Company** offered to sell the site of its Waterbury plant, together with the buildings and part of the machinery to the city as a site for the proposed new high school. The company has two plants, one in this city on North Elm street being the machinery division and one in Waterville, being the manufacturing division. It is the North Elm street site which it is proposed to sell. No price has been set on it as yet.

It is understood that the company, if it sold the North Elm street plant would immediately build a new machinery division adjacent to its manufacturing plant in Waterville, either on the land that the company owns there or on land to be purchased there. The school department's plans have been to make the new high school building a classical school and use Crosby high building—now used for both classical and vocational training schools—as the vocational school. If the company's offer is accepted, however, it would mean using the Crosby building as the classical school and making the new school the vocational school.

John P. Elton, president of the company, denies that the company has any present intention of abandoning its plant, but says if the school department cares to purchase it, the company will secure another site and build there. This location would very probably be in Waterville, adjacent to the manufacturing division, he said.

The depression in the local brass industries which has lasted throughout the summer is beginning to end. Most of the plants which have been working five days, eight hours a day, have gone on to a nine hour basis. This, and the fact that all the local brass plants have raised the price of brass is taken to indicate that the low point of depression has been passed and that business is on the up grade.

The **American Brass Company, Scovill Manufacturing Company** and the **Chase Companies,** early in the month, announced an increase in the price of brass amounting to one-quarter of a cent a pound on sheet brass, wire and rods, one-half a cent on seamless tubes and three-eighths of a cent on sheet copper. This increase was immediately adopted by all the smaller brass plants. The reason given for the increase by the local brass officials is that the brass market has developed much strength of late and is in a better condition now than for some months past. The increasing strength of the market and the resultant raise in the price of brass is expected to stimulate buying, with the result that the local mills will become more active and increase their working hours and force of employees.

Attorney **Charles E. Hart,** former corporation counsel of the city, recently appointed general counsel for the **Chase Companies,** has been elected assistant secretary of the latter, succeeding **Benjamin I. Spock,** former general counsel of the com-

panies and now on the legal staff of the New Haven road.

Herbert M. Upson has been elected assistant treasurer of the companies. This action was taken at the annual meeting of the directors last month. The other officers elected are: President, **Frederick S. Chase**; vice-president, **Irving H. Chase**; treasurer, **Richard D. Ely**; secretary, **Robert L. Coe**; controller, **William A. Purdy**.

Richard D. Ely, of the Chase Companies, has been elected a director of the Waterbury National bank, succeeding B. I. Spock.

Rodney Chase, of the Chase Companies, is spending his vacation in Europe.

Five hundred employees of the **Waterbury Brass Goods Company**, a division of the American Brass Company, enjoyed their annual outing at Lake Quassapaug, August 9th.

The **Berbecker & Rowland Foremen's Association** held its annual outing at Savin Rock, August 16.

The **Scoville Company's Foremen's Association** held their outing on the same date at Double Beach.

Chandler Norton Wayland, of New York City and Stonington, formerly identified with the American Brass Company, and grandfather of Elton Scovill Wayland, of this city, left an estate of $697,936, according to the appraisal of his property recently made. The entire estate passes to his son, John Elton Wayland, of New York City, formerly connected with the American Brass Company. Little stock in local concerns were included in his estate which consisted principally of municipal bonds.

The estate of the late **George E. Judd**, president of the Mattatuck Manufacturing Company, amounted to close to $500,000, according to his will filed in the probate court last month.—W. R. B.

BRIDGEPORT, CONN.

SEPTEMBER 2, 1924.

Charged with stealing 13 brass ingots from the **Belknap Manufacturing Company**, where he was doing some work, Norman Davis, of Howard avenue, a truckman's helper, was sentenced to two months in jail, in the city court, August 15. The police found the ingots under the seat of Davis' truck.

Business is growing at the **Columbia Phonograph Company**, and the East End plant on Barnum avenue is working day and night. The West End plant has just started on a big order for motors with the full force at work again, following the summer vacation, according to a statement given out at the office of H. L. Wilson, president of the concern. The statement was prompted by a report that a shutdown was contemplated at the local plants of the concern. The president stated that an increasing schedule of production on motors is being put into effect at the West End plant and that this is one of the busiest seasons of the year for the concern as the manufacture of machines for the Christmas trade is now in progress. The West End plant was operating with a skeleton force for two weeks, while most of the workers were having their vacation, officials state, but the full force is now on the job again and there is no prospect of curtailment.

C. K. Woodbridge, president of the **Dictaphone Corporation**, who has just returned from Europe, declared in an interview last month, that European business men are optimistic regarding the future and are anxious to resume trade relations on a larger scale with this country. A boom in business on the other side is only a matter of a few months, he stated.

The Manufacturers' Association of the city held its annual outing on the land of the Bridgeport Hydraulic Company, at Easton, last month.—W. R. B.

TORRINGTON, CONN.

SEPTEMBER 2, 1924.

Mrs. William E. Besse, wife of **Superintendent Besse**, of the **Torrington Branch** of the **American Brass Company**, died at her home, at 76 Cook street, Torrington, on August 17. She was 69 years old, and was married to Mr. Besse in 1894. Though she had been in poor health for some time, death same most unexpectedly. Mrs. Besse was active in church work in Torrington and is widely mourned. Besides her husband she leaves a sister and a brother. The funeral was held August 19.

August Sonnenberg, aged 80, for over 30 years an employe of the Torrington Branch of the American Brass Company, died suddenly August 18.

H. H. Fuessenich has been named a member of the city school board to fill the vacancy caused by the resignation of his brother, **F. W. Fuessenich** who is now residing in Litchfield. The brothers are both affiliated with the **Hendey Machine Company**, of which their father, ex-Senator F. F. Fuessenich, was for many years president.

Seats and tables for use on Torrington's public playground were donated during the past month by **W. R. Bassick**, president of the **Turner & Seymour Company**, who had been informed of the playground's need. The equipment was built by the trade school.

A few more workers are being taken on at Torrington metal plants, but working hours and other conditions remain practically unchanged. The number of orders shows no decreases, though the tonnage is smaller than during the preceding month. Looking at it from the manufacturers' end, the jobbers seem to be regulating their stock on a hand-to-mouth scale. Optimism prevails, however, and there is every indication of a healthy revival of business in the early fall. Wages remain the same, with the base price 50 cents an hour for unskilled laborers. Some of the shops are running on 55 hours a week, others on 50 hours and some on only 40 hours.

On August 15, the **Fitzgerald Manufacturing Company** held a reception to mark the formal opening of the big new addition to its plant. Employes of the Torrington and Winsted branches of the company were in attendance.

Harry Newport, for 15 years employed at the Torrington Branch of the American Brass Company, is now engaged at the **Ansonia Branch** of the same concern, but is to proceed shortly to Kenosha, Wis., where he will have charge of a hot press department which is being installed in the plant there. He expects to make his permanent home in Kenosha.—J. H. T.

NEW BRITAIN, CONN.

SEPTEMBER 2, 1924.

In the grip of a period of pronounced industrial depression for the past two months, New Britain factors now are resuming operations after complete shutdowns, in some cases of two weeks' duration. While no influx of orders warrants any great business optimism at the present time, there is an appreciable improvement in the general trend and several responsible heads have ventured the unofficial opinion that early winter will see business greatly improved and factories busier than for some time past.

The **Stanley Rule & Level Company**, the **Corbin Screw Corporation** and other factories have reopened since their vacation shutdown; but as yet, departments are curtailed. **Landers, Frary & Clark** also have cut down working hours in some departments, while the **Stanley Works** likewise, have been slack. The **P. & F. Corbin** and the **Corbin Cabinet Lock** divisions of the **American Hardware Corporation** have withstood the business slump probably better than most concerns and at no time has there been any noticeable laying off of workers or curtailment in working hours.

In Bristol, the **New Departure Manufacturing Company** is very dull and the **Bristol Brass Company** also is experiencing a similar depression.

The **Traut & Hine Manufacturing Company**, of this city, is admittedly in a bad way, and while interest on notes is being paid, the company has paid no dividends for a long time and business is such that not only is the factory on short hours, but also the working force has been greatly reduced. It is stated on excellent authority that a force of efficiency experts has been called in and they have advised something in the nature of a business reorganization.—H. R. J.

PROVIDENCE, R. I.

SEPTEMBER 2, 1924.

Some idea of the uncertain business conditions in the industrial circles of Rhode Island may be obtained in the an-

nouncement made by the **Brown & Sharpe Manufacturing Company**, on Wednesday, August 20, up to which time it had been expected that the big tool plant, after several weeks' shut down, would resume operations the following Monday. Instead, the following notice was posted and published in the daily papers; as a notice to employees:

"The works will not generally resume operations on Monday, August 25, as anticipated, owing to the continued depression in business; with the exception of certain departments, they will remain closed until Tuesday, September 2. The few whose services may be required before that date will be notified by the foreman of the department concerned."

The plant has been closed since August 1, which is one of the longest idle periods experienced by the concern in several years. And similar conditions prevail generally in the metal trades of this city and vicinity. The various branches of the manufacturing jewelry industry are especially affected. With the exception of some special novelty of fad line, there has been comparatively little doing among the jewelers all this year, and the outlook is not particularly encouraging. There will probably be a few weeks of over-time activity this fall for the holiday supply, but no settled condition is expected. What the next year will have in store is very problematical.

Sheet metal workers and those engaged in lines connected with the building trades, have had, as a rule, fairly active business during the entire year, and the prospects appear good for a continuance at least so long as good weather conditions last.

McRae & Keller, Inc., one of the oldest manufacturing jewelry concerns in Attleboro, filed a voluntary petition in bankruptcy early in the month with schedules showing liabilities amounting to $145,484 and assets of $56,670. The principal members of the firm are **Arthur A.** McRae and **Laurence F. Keeler.** A few days' later Mr. McRae filed an individual petition, giving his liabilities as $169,305 and assets $7,854. A large part of his liabilities consists of accommodation paper, unsecured notes being held by local banks. Harold K. **Richardson** was appointed receiver of the business, with bond of $100,000.

The firm began business in May, 1890, and specialized in popular priced novelties, such as cigarette cases, lockets, belt buckles and knives. It got into difficulties the latter part of last year and through the first six months of this year, and after the officers of the concern had sacrificed heavily it was deemed expedient to bring bankruptcy proceedings.

William J. Creed, enameler, with plants in Attleboro and North Attleboro, has awarded to James A. Munroe a contract for the erection of a one-story stucco factory building to be erected on Orne street, North Attleboro. It is expected that it will be ready for occupancy early in September.

Notice has been filed at the office of the Secretary of State that **W. A. H. Wells Company, Inc.,** Providence, has increased its capital stock from $6,500 to $20,000.

Apco Manufacturing Company, Providence, has filed notice at the office of the Secretary of State that its capital stock has been changed from $500,000 to $200,000 and 20,000 shares of common stock without par value.

The **Universal Tool Company** has removed from 75 Richmond street to larger quarters, at 185 Eddy street.

The **A. B. Ring Company** has recently started in business at 152 Elmwood avenue, manufacturing a general line of gold filled and shell rings. Harold N. Kingman is the owner—W. H. M.

MIDDLE ATLANTIC STATES

ROCHESTER, N. Y.

SEPTEMBER 2, 1924.

With the fall season in the offering there are evidences of slight improvement in business activities in the manufacturing districts of Rochester. Inquiry today revealed a real feeling of optimism among the heads most industries using metals. In fact, superintendents of two large plants stated that they intended adding to their working forces on September 15, and that orders were accumulating in a most encouraging manner.

The brass foundries and electro-plating plants have endured a very dull summer season, but during the first two weeks of this month business brightened. However, activities slackened again after the 15th and are now operating along June's and July's level. However, at all the foundries it is expected that normal conditions will be again resumed before election.

Industry shows some improvement in the Lincoln Park district, where the **Pfaudler Manufacturing Company** and the **General Railway Signal Works** have increased their output during the past month. The several can plants are running at full blast. Activities at the **Stromberg-Carlson** plant have shown marked improvement since spring, and it is expected that before cold weather arrives the plant will be operating at full capacity.

No new metal-using industries have made their appearance in Rochester during the six months past, and none are planned, according to information obtained from leading manufacturers. The latter, however, are quite unanimous in anticipation of a real business boom early in 1925.—G. B. E.

NEWARK, N. J.

SEPTEMBER 2, 1924.

Claiming breach of an agreement on the part of **Tonks Brothers**, of Newark, suit to recover $120,000 damages has been instituted in the New Jersey Supreme Court by the **Radio Instrument Company**, of Newark. The agreement involved the manufacturing or assembling of a radio reproducer or loud speaker known as the Sea-tone reproducer. Under the agreement it is charged that the defendant was to furnish thirty-five of these instruments each working day for a period of one year. The instruments were to be packed in such a manner as to insure safe shipment without breakage. It is contended that the contract was not lived up to in furnishing 30 instruments a day and that the material was not of the best.

Federal Judge Runyon has appointed Irving Levine, of Passaic, as receiver for the **Economy Electric Company**, 187 Passaic street, Passaic, following the involuntary petition in bankruptcy by creditors.

Appointment of a receiver for the **Splitdorf Electric Company** is asked in a bill of complaint filed by Harry D. Halsey, a stockholder of the corporation in the Court of Chancery, at Trenton. Halsey asks that the firm be declared insolvent or show cause to the contrary. According to the bill the company was incorporated in 1912 and has an authorized capitalization of $3,500,000. The capitalization is said to have been increased in July, 1915, to $4,500,000. The business was established in New York in 1850 and at present is engaged in the manufacture of spark plugs, magnetos and other electrical supplies. It is claimed that early in June, 1923, because of business curtailment, the corporation discontinued its plant and executive offices at 393 High street, Newark, and that for the past four years it has been operating at a loss prejudicial to the interests of the stockholders. The complaint further declares that the capital and surplus has been reduced through losses from $6,241,588 to $4,413,062.

The following Newark concerns have been incorporated: **Cozzone Corporation,** $50,000 capital, to manufacture radio parts. **Dynetron Tube Corporation,** $2,000, radio supplies. **Newark Sheet Metal and Kalomein Company,** $100,000 capital, fireproof materials. **Imperial Electrical Manufacturing Company,** $25,000 capital, electrical appliances. **Ideal Metal Products Company, Inc.,** $125,000 capital, manufacture metal products.

TRENTON, N. J.

SEPTEMBER 2, 1924.

The metal industry in Trenton is looking forward to improvement during the next few months, despite the fact that there has been a noticeable decline during the late summer. One of the chief reasons for a decline in business is attributed

to the presidential year when many buyers refrain from buying very heavy. This has always been a noticeable fact during the year when the presidential race is on.

J. Philip Bird, president of the Manufacturers' Association of New Jersey, believes conditions are favorable for a general revival in business this fall. He believes that all signs point to this plainly and that the civilized world at last has had set down before it in the Dawes plan the chart of a safe and definite course whereby to steer.

Chancellor Walker has appointed **Emil Stremlau**, of Perth Amboy, N. J., as receiver of the **Simplex Foundry and Machine Company**, of that city. The appointment was asked by stockholders of the concern. It is said that the alleged insolvency of the concern is due largely to family trouble by two brothers who are associated in the business.

The Middlesex County Board of Taxation has allowed a reduction to the **Raritan Copper Works** of a personal assessment of $1,617,550 to $1,455,795. Several hearings were held on the appeal of the copper works involving the expenditure of a considerable sum of money by the appellant in proving to the tax board that the personal property of the plant was over-assessed. The company made the contention that it would be unjust to assess the personal property at its true value, while other industrial plants were not assessed at 50 per cent of the true value.

The **Anaconda Copper Mining Company** will erect a new plant at Rutherford, N. J., for the manufacturing of copper clad shingles. The new product will compete with wood and other shingles now in use for roofs, and the cost will be less than that of the regular copper shingles.

Walter H. Orr, of Trenton, N. J., president of the **Orr Machine Guarding Company**, Trenton, was recently found guilty of drunken driving by a justice of the peace, at Lambertville, near Trenton, and sentenced to serve 30 days in the Hunterdon county jail. His driver's license was also revoked for a year and he was assessed the cost of the trial. An appeal was immediately taken and he was released under bond. The Court of Common Pleas will now pass on the sentence.

The following concerns have been chartered at Trenton: **Oil Appliance Company**, Jersey City, $100,000 capital, to manufacture electrical appliances. **Bi-Metallic Radio Parts, Inc.**, Newark, $100,000 capital, to manufacture radio parts. **The Kile Company, Inc.**, Lake Como, $25,000 capital, to manufacture metal threads.—C. A. L.

PHILADELPHIA, PA.

SEPTEMBER 2, 1924.

With the near approach of the close of summer, a summer punctuated with an unusually poor volume of business in the nonferrous metal trades, the optimists are preparing themselves for a siege of good business conditions which they expect will materialize about the middle of next month. Just now, to most Philadelphia merchants, the outlook is none too promising or encouraging; prices are off for a fairly profitable trade and coupled with that and despite the opportunity offered by low prices, buyers are reluctant purchasers. The same conditions have prevailed for several months with no apparent or definite information when they will cease. This is not an attempt to analyze the local market in a pessimistic mood, but the actual conditions as they are found. "There is no business," "Worst I've ever seen," are only a few of the morose replies to questions of business trends or current positions. There are no large orders in any of the lines. Small and infrequent buying seems to be the rule.

In this city there should be considerable buying of lead, zinc and brass by industries associated with the automotive industry, but there is an absence of orders. A survey of the plants discloses they are preparing for increased business in many ways and it is believed that orders from these sources will eventually be received. Manufacturers of plumbing supplies also find a depression in their trade. Although many building operations are planned, orders have not entered the market. There has been a slight improvement in the zinc market in the last few days with an attendant rise in price. Copper is dull and virtually unsought. Tin sales are poor; this can be accounted for to some extent by the wider use of other roofing materials and the decrease in truck produce with its lessened demand for cans. Lead, which for a few days took a spurt, is now one of the poorest sellers. Scrap metals are low in price, yet buyers are alleged to be delaying placing of orders to force further reductions.—A. F. C.

MIDDLE WESTERN STATES

INDIANAPOLIS, IND.

SEPTEMBER 2, 1924.

The name of the **Bertha Plating Works**, at 857 East Pratt street, Indianapolis, has been changed to the **Ability Plating Works.**

Announcement has been received in Indianapolis of the marriage at Rushville, Ind., of **Edward Hughes**, assistant manager of the **Michigan Copper and Brass Company**, Detroit, Mich., and **Miss Helen Scudder**, of Rushville. The ceremony was celebrated in St. Paul's Methodist church. Following the ceremony, a short reception was held at the church and the couple left immediately for a wedding trip through the Berkshire mountains and other points east.

Judge Kittinger, in circuit court at Anderson, Ind., has issued an order directing the receiver of the **Anderson Foundry and Machine Works**, of that city, to receive any written proposition tendered by any person or corporation for settlement of the trust, purchase of the property or reorganization of the company. A petition of a committee of stockholders to intevene in the receivership proceeding was denied by the court.—E. B.

DETROIT, MICH.

SEPTEMBER 2, 1924.

The brass, copper and aluminum industries probably are feeling the depressed business conditions here as keenly as any other, but those engaged in it express the most optimism. Everyone believes as soon as the Presidential campaign is over business will begin to improve, although nothing like a real boom is anticipated at any time during the remainder of the year. Most of the plants are working on part time, but almost none are closed down. The automobile industry, on which the industry depends for a great part of its business, still remains quiet.

The **Detroit Brass & Malleable Works** have declared their regular monthly dividend of one-half of one per cent, to stock of record of August 26. The **Pemberthy Injector Company** has declared a quarterly dividend of one per cent on the preferred stock, payable September 30, to stock of record of September 25.

The **Higgins Brass & Manufacturing Company** has contracted for the erection of a one-story steel frame factory building, 80 by 100 feet, to cost $21,965, on Dequinder street, between Carpenter and Davidson avenues.

The **Edmunds & Jones Corporation**, it is stated, has jumped from a production of approximately 3,000 automobile lamps in 1905 to a production of 4,000,000 lamps in 1924, and it is believed this record may be fully equaled, if not exceeded, at the close of 1924. This concern started originally as a partnership under the management of **George E. Edmunds** and **Willian T. Jones.** It recently has increased its floor space from 275,000 square feet to 305,000. The new three-story unit is one of the most complete and modern building of its kind. It is fireproof throughout, 166 feet long and 90 feet wide. One of its outstanding features is the enameling room, this being hermetically sealed. All the air in it is filtred and washed. The ovens, of course, are electrically heated. Materials are prepared on the floor beneath the enameling room and passed from one operation to the other by means of automatic conveyors. The company's laboratory also is housed in the new building. The entire new unit has been planned to attain maximum output with a minimum waste of labor.

Industries here are preparing what is claimed to be the ground work for substantial returns to activity on a sound basis. Notable in the work to this end is a readjustment of

both day and piece work rates of pay—accomplishing a fair and equitable appointment to labor in alignment with general price decline. This trend of the wage level from the high points recently manifest seems to be a natural one and not unlooked for by labor during a period of contraction. In fact, it seems to be inevitable before a return in business is possible. There have been no general wage reduction announcements. Following the dismissal of employes, however, declines were put into effect ranging from five to 30 per cent on both day and piece work. As a consequence, as employment rosters of the various automobile accessory plants where much brass, copper aluminum are used, the new and lower scales of pay are put into force.

Frederick B. Stevens, of the **Frederick B. Stevens Company**, dealers in foundry supplies, has some interesting philosophy to offer, which is appreciated at the present time.

"We are traveling a lot faster than we used to, but we are not making progress any faster. We are simply going around the same old ruts at higher speed.

"Success is won by doing a thing differently than any body else is doing it, but at the same time doing that thing logically.

"Making money is like playing marbles for keeps. After a boy has been given a whole bushel basket of mobs he has no further zest for the game.

"Opportunity knocks persistently and loudly at every man's door, but she won't break it down and drag the slumbering inmate outside.

"We live in an age of stereotyped mentalities."—F. J. H.

OTHER COUNTRIES

BIRMINGHAM, ENGLAND

AUGUST 18th, 1924.

In most of the metal industries work has slackened during the last two or three weeks, due partly to holiday influences. A great many firms close for a week or more in August for stock taking and the overhauling of plant. Export business also is usually dull at this time of year, though there is still much work to be done in completing orders received in the spring. The most serious factor is the strike in the building trades which is holding up building to a very large extent all over the country. At the present moment the prospect of an early settlement is by no means good. A further peril is that of a general strike of electrical workers. Some 300,000 men employed in municipal and other electric light and power stations are directly concerned in the demand for an increase of 10/- a week in wages, but the strike would involve a stoppage on a much wider scale. Public lighting and electric railways and tramways would be affected, while the number of mills and factories using for power purposes current from the public has enormously increased during the last few days especially in Birmingham and other metal trade centres. As the result of the intervention of the Minister of Labor the strike, due last week, has been postponed pending the setting up by the National Joint Industrial Council of a special Conciliation Committee, but a peaceful settlement is still considered doubtful.

Manufacturers of gas and water fittings, locks, door and window fittings and other builders' brassfoundry are suffering severely in their home business from the strike of building trade workers. The furnishing and shop-fitting trades have also received a setback to the detriment of the cabinet brassfounder. Some compensation has come to the brass trade as the result of reviving activity in shipbuilding. Orders for cabin and other ships' fittings and for machinery parts and for ships' lamps are becoming more numerous, though the revival is by no means rapid. India is taking a little more cabinet brassfoundry now, but business out there is obtainable only by quoting less than pre-war prices. New business for the rolling and wire mills is coming in but slowly.

Silversmiths are a little better off for orders than are electroplaters. The latter still find demand confined almost entirely to the strictly utility articles, and, in general, to the cheaper qualities. A good deal of the employment in the trade is in the manufacture of goods which are given away as presents by vendors of other articles. In the jewelry trade there is an increasing amount of this class of business. The large influx of visitors from abroad attracted by the British Empire Exhibition at Wembley has brought a few orders for goods of a good class both in plate and in jewelry, but the trade as a whole is still in a very depressed state.

The most hopeful outlook for the metal trades is still in the British overseas dominions. Business with Australia is improving and South Africa is making increased demands, especially for builders' hardware. The success of the London Conference in regard to German reparations will tend to improve trade generally by restoring commercial confidence. Apprehensions, however, are felt as to the effect in regard to German competition in the home and export markets. As regards the former, the abolition of the 33⅓ per cent Safeguarding of Industries duty, fixed for August 19th is expected to bring a flood of German imports, especially of aluminum hollow-ware, but there will be some set-off in the reimposition of the 26 per cent Reparations levy, which a short time ago the Labor Government reduced to 6 per cent.—G.

Business News—Verified

The **American Seeding Machine Company**, Springfield, Ohio, is remodeling its foundry core room.

T. Bradley has purchased the plant of the Modern Plating Works, at 210 Water street, Paterson, N. J. This firm operates the following departments: plating, polishing, lacquering, grinding.

S. A. Day Manufacturing Company, 1483 Niagara street, Buffalo. N. Y., manufacturer of platers' equipment and supplies, has erected a building to take care of the increase in its paint department.

The **Artistic Lighting Fixture Corporation** has removed its factory from 21 E. Houston street, New York City, to 215 Greene street. This firm operates the following departments: casting, plating, lacquering, soldering.

The **U. S. A. Novelty Manufacturing Company**, 350 West 52nd street, New York City, announces that all correspondence and shipments are to be addressed to its factory office at West Nyack, New York, until further notice.

Rumor published in daily papers to the effect that the **Art Metal Construction Company**, 1020 Jefferson County Bank building, Birmingham, Ala., is contemplating opening a branch factory at South Jacksonville, Fla., is incorrect.

Platt Brothers & Company, Waterbury, Conn., manufacturers of metal eyelets and similar specialties, state the report that they are planning the erection of a two-story addition, 120 x 125 ft., as published in other journals, is not true.

F. L. & J. C. Codman Company, 15 Elkins street, South Boston, 27, Mass., has recently moved its Detroit plant to new quarters into its own building. The building is of brick and concrete construction 75 x 100 ft., one-story, and cost a little over $30,000.

Anaconda Copper Mining Company, 25 Broadway, New York, has awarded a general contract to the Walter Kidde Company, 90 West street, for a one-story plant at Rutherford, N. J., 80 x 255 ft., equipped as an electro-plating works, estimated to cost $130,000.

Detroit Copper & Brass Rolling Mills, Detroit, Mich., has moved its Chicago headquarters from 111 North Jefferson street to its new building at 1326 West Washington Boulevard. This firm operates the following departments: casting shop, rolling mill, tinning, polishing.

Columbus Iron Works Company, Columbus, Ga., operator of gray iron, brass and aluminum foundries, was slightly damaged by fire recently. This firm operates the following departments: brass machine shop, tool room, casting shop; brass, bronze and aluminum foundries.

The **Artcraft Auto Lamp Manufacturing Company**, 141 West 54th street, New York, has changed its name to the Artcraft

Metal Novelty Company, more accurately to describe its business. This firm manufactures antique metal goods and auto lamps; also does spinning and stamping for the trade.

Trenton Malleable Iron Company, Trenton, N. J., operator of gray iron, malleable, brass and aluminum foundries, has awarded general contract to Joseph D. Drugan, for a 1-story, 70 x 120-foot plant addition. This firm operates the following departments: brass, bronze and aluminum foundries, casting shop.

Detroit Copper and Brass Rolling Mills, Detroit, Mich., is remodeling its power plant and increasing its capacity by the addition of a 600 horsepower boiler fired by a Taylor stoker with automatic steam ash dump. This company already has in operation five 600 horsepower boilers fired by Taylor stokers.

American Nickeloid Company, Peru, Ill., announces the appointment of John R. Fullam as Chicago district representative, covering all territory in and about the cities of Chicago and Milwaukee. Mr. Fullam's headquarters are at 1551 W. Madison street, Chicago. He is widely known among the metal and allied trades.

A. J. Lindemann & Hoverson Company, Milwaukee, Wis., manufacturer of stoves, has awarded contracts to the Great Lakes Construction Company, 308 S. Wabash avenue, Chicago, for a 6-story plant in the latter city, to be used exclusively as a warehouse and office. This firm operates brass, malleable, aluminum, and gray iron foundries.

The **J. B. Ford Company,** manufacturers of Wyandotte metal cleaners and other industrial cleaning materials bearing the Wyandotte brand, will be represented at the International Steel Exposition of the American Society for Steel Treating, in Boston, September 22-26, by F. S. DuGray and E. K. White, of the Boston office, J. W. English, of the Providence office, and B. N. Goodell, of Wyandotte.

The plating business in the Beaver Valley is in a most satisfactory and prosperous condition, if we are to judge from the fact that the **John H. Jersey Plating Company,** cor. Virginia avenue and Reno street, Rochester, Pa., is going about building a plant which will triple their production. This company is building a high grade fire-proof building, made of cement blocks, to be equipped by the very latest modern equipment. It will be in use about October 1.

Warren Webster & Company, Camden, N. J., announces the opening of a New Haven branch office at 902 Chapel street, New Haven, Conn., under management of Henry R. Briggs. This branch office is opened to meet the convenience of customers in the State of Connecticut, north and east of Norwalk. The New Haven office will be operated as a branch of the New York office under management of John A. Serrell, Engineer-in-Charge, 15 West 34th street.

A. F. Corner, James Wisdom and O. W. Bottorff have installed a brass and aluminum foundry in the rear of the Harding Cream Company plant, 815 Spring street, Coffeyville, Kan., under the name of the Mid West Brass Works. It will do custom work, but will specialize in the manufacture of an automobile cooker for tourists. This firm will operate the following departments: brass, bronze and aluminum foundries; plating, polishing, lacquering, brass machine shop.

With the completion of a new building adjourning its plant at 1100 East Mill street, Springfield, Mo., the **Ampco Metal Products Company** has opened its foundry department. The new building, which is 50 ft. x 100 ft., is located just east of the main plant, and will be used exclusively for additional molding room. General casting work in gray iron, brass and aluminum will be done in the new plant. The company has also installed a general sheet metal and furnace department and a machine shop, which is being enlarged. This firm has heretofore engaged in manufacturing a patented interlocking stove pipe and metal fence posts, and will continue in these lines, employing about 30 additional workmen in the plant since the enlargement of operations. This firm operates the following departments: brass, bronze and aluminum foundries; brass machine shop, tool room, grinding room, casting shop, cutting-up shop, stamping, soldering, polishing.

At a meeting of the directors of the **Linndale Reduction Company,** formerly held by the Koblitz-Kohn Company, Cleveland, Ohio, held August 1, 1924, three new directors were elected in the place of J. B. Kohn, M. C. Kohn and J. H. Tyroler, resigned. The new members of the board are Archibald R. Watson, James W. Paterson and James M. MacNee, in addition to Julian B. Beaty, Elmer H. Simonson, Walter C. Bennett, who remain upon the board. Mr. Watson, who was elected chairman of the board of Linndale, is also president of Balbach Smelting and Refining Company, and Mr. Beaty, president of Linndale, is vice-president of Nichols Copper Company. Of the other four members of the board, two are also identified with Nichols Copper Company and two are officers of, or have been connected with the Balbach Company. The full official personnel of Linndale, as now announced is: Archibald R. Watson, chairman of the board; Julian B. Beaty, president; Elmer H. Simonson, vice-president and general manager; James W. Paterson, vice-president; James M. MacNee, secretary and treasurer; Walter C. Bennett, assistant secretary and treasurer. Although the Koblitz-Kohn Company will have no further part in the management of the Linndale Company, the Koblitz-Kohn Company will continue as local purchasing agents in the city of Cleveland for copper bearing materials.

INCORPORATIONS

The **General Metal Briquette Corporation,** 25 Broad street, New York City, has been incorporated with 500 shares of stock, no par value, to manufacture metal products, having been organized to take over a portion of the assets of the General Briquetting Company. Temporary address is in care of A. L. Stillman, 25 Broad street.

M. S. Weisman Brass Company, 125 Bleecker street, New York City, has been incorporated with $25,000 capital stock to take over the business of a co-partnership in the manufacture of lighting fixtures. M. S. Weisman heads the company. This firm will operate the following departments: brazing, plating, soldering, polishing, lacquering. It is interested in plating room equipment.

Modern Brass Foundry & Manufacturing Company, Columbus, Ohio, has been incorporated for $50,000. The company is taking over the Modern Brass Foundry which was established in 1919 by Mr. Gliech. The new company intends to operate a gray iron foundry in connection with its present foundry. This firm will operate the following departments: brass, bronze, and aluminum foundries.

Clayton Mark, formerly president of the Mark Manufacturing Company, and connected with the steel industry in the Chicago district for more than thirty years, has formed a new company to be known as **Clayton Mark & Company.** The company is capitalized at $1,500,000 and will manufacture the same products as the Mark Manufacturing Company, recently merged with the Steel & Tube Company of America, and later sold to the Youngstown Sheet & Tube Company. The principal products will be steel pipe, electric wire conduit and water well supplies.

Mosebach Electric & Supply Company, 1115 Bronsville avenue, Pittsburgh, Pa., organized with $25,000 capital stock, is engaged in manufacturing weld test bond and arc weld rail bonds for street railroads, mines, etc. It also carries a stock of street railroad material, brass and bronze bearings for locomotives, mining machines and street cars, electric and gas welding equipment; also buys and sells second hand electric equipment for mine use. K. J. Mosebach is general manager. This firm will operate the following departments: brass, bronze and aluminum foundries; brass machine shop, grinding room, cutting-up shop, lacquering.

The **Watervliet Iron & Brass Foundry, Inc.,** Elm street and Cohoes road, Watervliet, N. Y., was recently incorporated and has taken over the Troy Brass Foundry. **Richard Sees,** formerly head of the Troy company will have charge of the brass department in the new concern, which is erecting a building and installing additional equipment for the manufacture of gray iron castings. The business will be operated as a jobbing foundry. A. W. Meyer is president; J. C. Rohleder, vice-president, and Richard Sees, treasurer. This concern will operate the following departments: brass, bronze and aluminum foundries.

The **J. F. Devin Pattern Works,** 901 Kinnickinnic avenue, Milwaukee, Wis., has incorporated its business as the J. F. Devin Pattern & Manufacturing Company, with a capital

stock of $10,000. It is authorized to manufacture metal products in addition to making metal and wood patterns. This will require enlargement of the equipment, with extensions to the plant contemplated later. John F. Devin, Harry G. Ollenburg, Herbert C. Knudtson and C. T. Hagen are the principal owners. This firm will operate the following departments: brass, and aluminum foundries; brass machine shop, casting shop, soldering, polishing.

COPPER STORE FRONTS

It is estimated that during 1924 consumption of copper for store front construction will reach 5,000,000 pounds, so that within a period of three years, the tonnage of copper for this use will have almost doubled.

Store front construction in the United States consumed approximately 4,000,000 pounds of copper in 1923, an increase of nearly 1,000,000 pounds over the previous year, according to figures compiled by the Copper and Brass Research Association.

METAL PROSPECTS BRIGHT

L. Vogelstein, chairman of the American Metal Company, who recently returned from Europe, stated that the European atmosphere was less charged with national and racial hatred than since the war. He declared that more is being heard of economic co-operation.

Speaking of the outlook for metals, he said that he considered it better than in the past seventeen years.

"Europe," he said, "has to make up for lost time. We in this country have expanded in consumption of metals about 50 per cent. Europe's requirements, broadly speaking, are less than before the war. An approach to relative equalization is bound to occur. Electric super-stations utilizing water power or cheap fuel at mouth of mines, improved telephone and telegraph equipment and more facilities for comfortable and quick travel and transportation are some of the most urgent needs of Europe, and for all these purposes they will need our metals.

He predicted that copper, zinc and silver markets would be among those to profit to a great extent from the demands of Europe.

PLATINUM AND ALLIED METALS IN 1923

MINE PRODUCTION

The quantity of crude platinum produced in the United States in 1923 was 609 troy ounces, of which Alaska produced 7 ounces, California 578 ounces, and Oregon 24 ounces, according to a statement issued by the Department of the Interior, prepared from mine reports by James M. Hill, of the Geological Survey. This is a considerable decrease from the 1,008 ounces produced in 1922.

PLATINUM REFINED

The statistics show that refiners of platinum in the United States purchased, in 1923, 29 ounces of crude platinum from Alaska, 707 ounces from California, 63 ounces from Oregon, and 1 ounce from Washington, a total of 800 troy ounces, as compared with 1,058 ounces purchased in 1922. They also purchased 54,741 ounces of crude platinum mined in foreign countries, of which 48,727 ounces was shipped from Colombia and 4,997 ounces from Russia. The platinum metals recovered from crude platinum, from ore, and from gold, copper, and nickel refined amounted to 49,797 ounces, as compared with 57,718 ounces in 1922. Of the metals recovered in 1923 about 3,472 ounces was obtained from domestic material.

SECONDARY METALS RECOVERED

Refiners also reported the recovery from scrap material in 1923 of 47,872 ounces of platinum metals, a slight increase over the quantity recovered in 1922. The platinum metals recovered in 1923 constituted 21 per cent of the available supply of those metals in the United States during the year.

IMPORTS

The imports of platinum metals in 1923 were slightly less than in 1922, being 106,637 ounces against 110,025 ounces.

CONSUMPTION

The quantity of platinum metals consumed by industries in 1923 amounted to 190,783 ounces, an increase of 4 per cent over that consumed in 1922.

STOCKS

At the end of 1923 the stocks of platinum metals in the United States had decreased about 7 per cent as compared with those in 1922, being 70,725 ounces against 76,017 ounces.

SPECIFICATIONS FOR METALS APPROVED

The American Engineering Standards Committee has approved as "Tentative American Standrad" the following three specifications which had been submitted by the American Society for Testing Materials:

Specifications for Brass Ingot Metal, Graded and Ungraded, for Sand Castings (AESC No. H 10-1924).

Specifications for Solder Metal (AESC No. H 11-1924).

Specifications for High Sheet Brass (AESC No. H 12-1924).

The first of these cover brass ingot metal for sand castings, known commercially as red and yellow brass ingot, made wholly or partly from scrap materials. Seven typical alloys are specified and are designated as grades Nos. 1 to 7, in accordance with their decreasing copper content.

The specifications for Solder Metal cover lead-tin alloys commonly known as soft solder. Two classes, A and B, are given, in each of which several compositions are specified covering the range of alloys commercially used, and designated as grades 0 to 4, in accordance with their decreasing tin content. For galvanized iron and zinc, only class A should be used.

The specifications for High Sheet Brass are general ones, covering material commonly used for drawing, forming, stamping and bending.

The approval of these three sets of specifications as "Tentative American Standard" was recommended by a special committee under the chairmanship of R. W. E. Moore, and upon which the following organizations were represented:

American Marine Standards Committee.
American Institute of Mining and Metallurgical Engineers.
American Society of Mechanical Engineers.
American Society for Testing Materials.
Copper & Brass Research Association.
Electrical Manufacturers Council.
National Association of Master Plumbers.
Society of Automotive Engineers.
U. S. Navy Department.
U. S. War Department.
U. S. Bureau of Standards.
National Association of Manufacturers.

The special committee still has under consideration four other A S T M specifications. These are for admiralty gun metal, brass forging rod, free-cutting brass rod for screw machines, and naval brass rods for structural purposes. Special consideration is being given these from the point of view of their use by the Federal Government.

METAL STOCK MARKET QUOTATIONS

	Par	Bid	Asked
Aluminum Company of America	$100	$500	$525
American Hardware Corporation	100	78½	79
Anaconda Copper	50	38⅞	39
Bristol Brass	25	5	10
International Nickel, com.	25	18	18¼
International Nickel, pfd.	100	87½	88½
International Silver, com.	100	115	..
International Silver, pfd.	100	104	107
National Enameling & Stamping	100	21¾	22½
National Lead Company, com.	100	159	159½
National Lead Company, pfd.	100	116½	..
New Jersey Zinc	100	162	167
Rome Brass & Copper	100	120	135
Scovill Manufacturing Company	..	245	250
Yale & Towne Mfg. Company, new	..	67½	68½

Corrected by J. K. Rice, Jr., Co., 36 Wall street, New York.

Review of the Wrought Metal Business

Written for The Metal Industry by J. J. WHITEHEAD, President of the Whitehead Metal Products Company of New York, Inc.

SEPTEMBER 2, 1924.

Beginning about the last week of July, and continuing on to the middle of August there were several advances in prices on brass and copper rod, sheet, tube and wire. These advances, following closely on the advancing market for copper ingot, were responsible for starting a few flurries in buying, but there was no continued activity in the line of placing orders for any appreciable amount of steady tonnage, and as a result, dullness is noted around the brass and copper mills and complaints are heard that business is not what it ought to be. By many, this is regarded as only a temporary reaction caused by the buyers playing a waiting game to see what the trend of business will be, and as most of the business sentiment seems to be optimistic in its character the manufacturers are not greatly disturbed.

It is generally accepted as a fact that business on the whole is showing some improvement and the expectation is that as the Summer closes, the Fall activities will develop, and a satisfactory volume of business will be placed. Just how accurate these theories will prove to be, it is of course, at this time, impossible to tell.

There is, also, some disappointment in the fact that the ingot copper market has shown a tendency to weaken after having made such a start in the direction of higher prices, but this factor is expected to adjust itself along with the other industrial adjustments which are expected in the Fall. Other lines of the non-ferrous metal industry have experienced practically the same condition as outlined above, and as a result the month closes with a feeling of great expectation among the producers, but not very many orders on the books. The nickel silver business has in some ways been one of the worst sufferers during August, but as this is written some of the people in that line have expressed the view that they see a few signs of improvement. The Monel metal and pure nickel manufacturers report that while tonnage has not been coming in at a rate which can be regarded as satisfactory, nevertheless, it is felt that under all the conditions this line of the industry is doing about all that can be expected.

Metal Market Review

Written for The Metal Industry by METAL MAN

COPPER

SEPTEMBER 2, 1924.

Business in copper continued in substantial volume during August both for domestic and export account. There was also a firmer undertone to the market as the result of brighter prospects for European recuperation. Recent improvement in prices was based, to some extent, on expectation of reparations settlement. A restoration of foreign political accord and commercial agreements is expected to give a new and powerful stimulus to world trade in which copper will share extensively.

Early in August the market was 13⅛ cents for domestic deliveries, but before the middle of the month there was a material improvement which lifted prices to 13⅜@13¾ cents. Manufacturers and foreigners were free buyers of futures as the market strengthened. Firmer cables helped the situation, but slight reactions occurred in the second half of month and some nearby copper was available at concessions from top quotations. As we go to press electrolytic is available at 13⅛@13¼ cents for early shipment. Over-production is still in evidence.

ZINC

There was a comparatively fair domestic demand for zinc in August and a moderate export movement which placed the market on a firmer basis. Producers are apparently in position to maintain values fairly steady on account of improvement in the statistical situation. August supplies are well sold and fresh demand has taken a good tonnage for September shipment. Stocks increased 3,021 tons in July over those in smelters' hands on June 30. Total amount carried by smelters on July 31 was 52,705 tons, against 49,684 tons on June 30. Production in July was the smallest in nine months, and 4,753 tons less than in May. The July deliveries of 39,892 tons were the largest monthly shipments since April. Supplies, however, are the heaviest in many months and constitute a definite warning against further over-production. Quotations as we go to press are 6.57½@6.60c. New York, and 6.22½@6.25c. East St. Louis. Market dull and easy.

TIN

There were renewed evidences of the powerful grip London bull operators have on the tin market as prices were persistently pushed skyward. The upward movement has not been so popular here, however, although some local traders have been factors in recent bullish developments. Lack of vigorous consuming buying by American interests denotes absence of confidence in present market levels. If replenishment of domestic stocks continues on a hand-to-mouth basis it will prove an impressive resistance to the extreme bullish manipulation of prices. A short time ago prices were up to 53¼ cents for spot Straits, against 49¼ cents on July 31. A weaker tone developed near month end, and the price on August 26 was quoted at 50¾@51¼ cents, market quiet.

LEAD

A very good business was transacted in lead during August. As indicated in our previous issue the market developed decided strength, with price advance of fully a half cent per pound over the top level in July. Consuming demand is specially satisfactory and has resulted in large volume buying for nearby and future shipment. The basis price of the American Smelting & Refining Co. is 8 cents New York, but the outside market is firmer on favorable prospects for continued active demand. The statistical position of lead is considered good, and producers are understood to have very moderate supplies of spot material to offer. There has been a large London speculation in lead, but foreign consumption is also absorbing large quantities of the metal. Market as we close our report is quiet and less active at 8 cents bid. Producers are well sold up for next several weeks.

ALUMINUM

Present market conditions for aluminum continues firm on the basis of 28 cents for 99 per cent plus Virgin metal and 27 cents for 98-99 per cent grade for prompt and future deliveries. Recent sales were in larger volume than those of a few weeks ago, and there are evidences of improvement in the automotive industry which is a favorable feature for greater market activity. Consuming requirements underwent considerable shrinkage during the summer months, but more active demand is anticipated during the balance of the year. The leading producing interest is operating eight plants at capacity in preparation for a large fall and winter demand. Reports indicate that holdings in Germany are light, and fear of competition from German producers is of remote possibility.

ANTIMONY

Considerable antimony changed hands recently on an advancing market. China offerings are restricted from direct sources, although some resale lots were on the market at 8¼ cents c. i. f. New York for August to October shipment. Dealers have been picking up spot lots lately in expectation of market going higher. Consumers, however, are reluctant to replenish supplies at current quotations. Chinese regulus of 99 per cent pure quotes 10½ cents duty paid for carload lots. Demand is quiet and buyers cautious about placing fresh orders at the advance. China has renewed offers in this market at 8¼c. c. i. f. New York for September shipment, but buyers are indifferent on that basis.

QUICKSILVER

New inquiries are confined to small lots, and the market hovers around $72.50 for 75-pound flasks. The London quotation advanced to £13 to £13 5s., but the firmer tone has not resulted in any important buying yet. The market is considered as potentially strong and likely to advance should active buying develop.

PLATINUM

Price of refined platinum holds up steady at $120 an ounce. Buying, however, is light. Consumers are not putting out any important inquiries apparently. Imports this year are on the increase, but prices are well maintained notwithstanding the increase in supplies.

SILVER

Foreign buying of silver has added greatly to the volume of recent business in the American product. Demand for coinage purposes is an outstanding feature of the situation. Germany was a recent buyer of 4,000,000 ounces and it is understood further needs of that country will amount to approximately 20,000,000 ounces. The additional quantity will probably be purchased in installments of 4,000,000 to 5,000,000 ounces at current market quotations when sales are made. The use of silver money is being advocated in this country as well as in foreign countries. A token coin, much smaller and lighter than the real silver dollar, is spoken off to be secured by silver of full value held in U. S. Treasury vaults. If the movement is taken up by the Government and approved by Congressional action, it will be a big factor for the benefit of the silver-copper mines of the country. Price of silver bullion is 68¾c. an ounce, against an average of 64.8c. in 1923.

OLD METALS

Demand for scrap metals has made steady progress lately and prices in several groups have advanced gradually. Underlying conditions have improved very decidedly and dealers entertain optimistic sentiments over the outlook for business in the coming months. There has been substantial buying of old copper and lead, also of other scrap material. The turnover in August was on a good scale, and a further increase in demand is anticipated during September. Price quotations which dealers were prepared to pay recently were: 11@11¼c. for heavy copper, 9¼@9½c. for light copper, 11¼@11½c. for crucible copper, 6¼@6¾c. for heavy brass, 8¼@8½c. for new brass clippings, 7@7¼c. for heavy lead, 4¾@5c. for battery lead, 19½@20c. for aluminum clippings and 4@4¼c. for old zinc scrap.

WATERBURY AVERAGE

Lake Copper—Average for 1923, 14.979—January, 1924, 13.00—February, 13.125—March, 13.875—April, 13.625—May, 13.25—June, 12.75—July, 12.75—August, 13.625.

Brass Mill Zinc—Average for 1923, 7.479—January, 1924, 7.25—February, 7.50—March, 7.25—April, 7.00—May, 6.00—June, 6.60—July, 6.70—August, 6.90.

Daily Metal Prices for the Month of August, 1924

Records of Daily, Highest, Lowest and Average

	1	4	5	6	7	8	11	12	13	14	15	18
Copper (f. o. b. Ref.) c/lb. Duty Free												
Lake (Delivered)	13.25	13.25	13.375	13.375	13.375	13.625	13.75	13.75	13.75	13.875	13.875	13.75
Electrolytic	13.00	13.00	13.25	13.25	13.25	13.25	13.50	13.50	13.50	13.60	13.55	13.60
Casting	12.70	12.70	13.00	13.00	13.00	13.00	13.25	13.25	13.25	13.375	13.375	13.325
Zinc (f. o. b. St L.) c/lb. Duty 1¼c/lb.												
Prime Western	5.95	6.05	6.15	6.20	6.15	6.10	6.20	6.20	6.20	6.20	6.20	6.20
Brass Special	6.05	6.10	6.20	6.25	6.20	6.15	6.25	6.25	6.25	6.25	6.25	6.25
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	49.625	50.125	51.625	51.875	51.875	52.00	52.00	51.625	51.75	52.875	52.875	52.625
Pig 99%	49.125	49.625	51.125	51.375	51.375	51.50	51.50	51.125	51.25	52.375	52.375	52.125
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	7.45	7.40	7.35	7.40	7.40	7.45	7.65	7.70	7.75	7.90	8.00	8.10
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot—Internat. Nick. Co.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Outside Spot	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00	27.00
Electrolytic (Internat. Nick. Co.)												
Ni.—99.80 contam. impur.—.14	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	9.00	9.00	9.00	9.00	9.00	9.125	9.125	9.125	9.125	9.125	9.50	9.75
Silver c/oz. Troy Duty Free	68.25	68.50	68.625	68.375	68.50	69.125	69.00	68.625	68.75	68.625	68.00	68.375
Platinum $/oz. Troy Duty Free	120	120	120	120	120	120	120	120	120	120	120	120

	19	20	21	22	25	26	27	28	29	High	Low	Aver.
Copper (f. o. b Ref.) c/lb. Duty Free												
Lake (Delivered)	13.75	13.75	13.75	13.75	13.75	13.625	13.625	13.625	13.625	13.875	13.25	13.631
Electrolytic	13.55	13.50	13.50	13.50	13.375	13.25	13.30	13.30	13.30	13.60	13.00	13.373
Casting	13.375	13.25	13.25	13.25	13.25	13.00	13.00	13.00	13.00	13.375	12.70	13.112
Zinc (f. o. b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	6.25	6.25	6.25	6.25	6.25	6.20	6.20	6.25	6.25	6.25	5.95	6.188
Brass Special	6.30	6.35	6.35	6.35	6.35	6.30	6.30	6.30	6.30	6.35	6.05	6.255
Tin (f. o. b. N. Y.) c/lb. Duty Free												
Straits	52.50	52.75	53.25	52.60	51.50	51.125	52.00	51.625	52.25	53.25	49.625	51.927
Pig 99%	52.125	52.375	52.875	52.125	51.00	50.625	51.50	51.125	51.75	52.875	49.125	51.452
Lead (f. o. b. St. L.) c/lb. Duty 2½c/lb.	8.20	8.15	8.15	8.15	8.15	8.15	8.10	8.00	8.00	8.20	7.35	7.838
Aluminum c/lb. Duty 5c/lb.	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
Nickel c/lb. Duty 3c/lb.												
Ingot—Internat. Nick. Co.	28.00	28.00	28.00	28.00	28.00	28.50	28.50	28.50	28.50	28.50	28.50	28.095
Outside Spot	27.00	27.00	27.00	27.00	27.00	27.50	27.50	27.50	27.50	27.50	27.50	27.095
Electrolytic (Internat. Nick. Co.)												
Ni.—99.80 contam. impur.—.14	30.00	30.00	30.00	30.00	30.00	31.00	31.00	31.00	31.00	31.00	30.00	30.190
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	10.25	10.50	10.50	10.50	10.50	10.50	10.50	10.25	10.25	10.50	9.00	9.649
Silver c/oz. Troy Duty Free	68.50	68.50	62.625	68.50	68.125	68.375	68.625	68.50	68.75	69.125	68.00	68.536
Platinum $/oz. Troy Duty Free	120	120	120	120	120	120	120	120	120	120	120	120

*Holiday.

Metal Prices for September 2, 1924

Copper: Lake, 13.75. Electrolytic, 13.50. Casting, 13.125.
Zinc: Prime Western, 6.30. Brass Special, 6.35.
Tin: Straits, 53.375. Pig, 99%, 52.875.
Lead: 8.00. **Aluminum,** 28.00. **Antimony,** 10.25.
Nickel: Ingot, Internat. Nickel Co., **28.50.** Outside spot, 27.50. Electrolytic, Internat. Nick. Co., **31.**
Quicksilver, flask, 75 lbs., $72.75. **Silver,** oz. Troy, 68.75.
Platinum, oz. Troy, $120. **Gold,** oz. Troy, $20.67.

Metal Prices, September 2, 1924

INGOT METALS AND ALLOYS

Brass Ingots, Yellow	10 to10¾
Brass Ingots, Red	12 to12¾
Bronze Ingot	12 to13
Bismuth	$1.85to$2.00
Cadmium	60
Casting Aluminum Alloys	21 to24
Cobalt—97% pure	$2.50to$2.75
Manganese Bronze Castings	22 to35
Manganese Bronze Ingots	11½to16
Manganese Bronze Forging	33 to42
Manganese Copper, 30%	28 to45
Parsons Manganese Bronze Ingots	17½to19¾
Phosphor Bronze	24 to30
Phosphor Copper, guaranteed 15%	18 to21
Phosphor Copper, guaranteed 10%	17½to20½
Phosphor Tin, guaranteed 5%	60 to65
Phosphor Tin, no guarantee	57 to62
Silicon Copper, 10% ....according to quantity	28 to35

OLD METALS

Buying Prices		Selling prices
11 to11¼	Heavy Cut Copper	12½to12¾
10½to10¾	Copper Wire	11¼to11½
9 to 9¼	Light Copper	9¾to10
8¼to 8¾	Heavy Machine Comp	10 to10½
6½to 6¾	Heavy Brass	8¼to 8¾
5½to 5¾	Light Brass	6¾to 7
6¾to 7	No. 1 Yellow Brass Turnings	7¾to 8¼
8 to 8½	No. 1 Comp. Turnings	9¼to 9¾
6¼to 6½	Heavy Lead	6¾
4	Zinc Scrap	4½
8	Scrap Aluminum Turnings	10
15½to16	Scrap Aluminum, cast alloyed	16½
18	Scrap Aluminum, sheet (new)	20
25	No. 1 Pewter	27
12	Old Nickel anodes	14
18	Old Nickel	20

BRASS MATERIAL—MILL SHIPMENTS

In effect Aug. 14, 1924

To customers who buy 5,000 lbs. or more in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.17¼	$0.19	$0.21⅛
Wire	.17¾	.19½	.21⅝
Rod	.15	.19¾	.21⅞
Brazed tubing	.25¼	.....	.30⅞
Open seam tubing	.25¼	.....	.30⅞
Angles and channels	.28¼	.....	.33⅞

To customers who buy less than 5,000 lbs. in one order.

	Net base per lb.		
	High Brass	Low Brass	Bronze
Sheet	$0.18¼	$0.20	$0.22⅛
Wire	.18¾	.20½	.22⅝
Rod	.16	.20¾	.22⅞
Brazed tubing	.26¼	.....	.31⅞
Open seam tubing	.26¼	.....	.31⅞
Angles and channels	.29¼	.....	.34⅞

SEAMLESS TUBING

Brass, 21½c to 22½c net base.
Copper, 22¾c to 23¾c net base.

TOBIN BRONZE AND MUNTZ METAL

Tobin Bronze Rod	19¼c. net base
Muntz or Yellow Metal Sheathing (14" x 48")	17¼c. net base
Muntz or Yellow Rectangular Sheets other Sheathing	18¼c. net base
Muntz or Yellow Metal Rod	15¼c. net base

Above are for 100 lbs. or more in one order.

COPPER SHEET

Mill shipments (hot rolled)	19⅝c. to 22⅛c. net base
From stock	20⅝c. to 22⅝c. net base

BARE COPPER WIRE—CARLOAD LOTS

16c. to 16¼c. net base.

SOLDERING COPPERS

300 lbs. and over in one order	19⅝c. net base
100 lbs. to 200 lbs. in one order	20⅛c. net base

ZINC SHEET

Duty, sheet, 15%. Cents per lb.

Carload lots, standard sizes and gauges, at mill, 9.85c. basis less 8 per cent discount.

Casks, jobbers' prices	11¼c. net base
Open casks, jobbers' prices	11¾c. to 12c. net base

ALUMINUM SHEET AND COIL

Aluminum sheet, 18 ga., base price	40c.
Aluminum coils, 24 ga., base price	36.70c.
Foreign	40c.

NICKEL SILVER (NICKELENE)

Net Base Prices

Grade "A" Nickel Silver Sheet Metal

10%	Quality	24½c.
15%	"	25¾c.
18%	"	26¾c.

Nickel Silver Wire and Rod

10%	"	27¾c.
15%	"	31c.
18%	"	34c.

MONEL METAL

Shot	32
Blocks	32
Hot Rolled Rods (base)	40
Cold Drawn Rods (base)	48
Hot Rolled Sheets (base)	42

BLOCK TIN SHEET AND BRITANNIA METAL

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 10c. over Pig Tin. 40 to 100 lbs., 15c. over 25 to 50 lbs., 17c. over, less than 35 lbs., 25c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 8c. over N. Y. tin price; 100 lbs. to 500 lbs., 10c. over Pig Tin. 50 to 100 lbs., 15c. over, 25 to 50 lbs., 20c. over, less than 25 lbs., 25c. over. Above prices f. o. b. mill.

SILVER SHEET

Rolled silver anodes .999 fine are quoted at from 71¾c. to 73¾c. per Troy ounce, depending upon quantity.

Rolled sterling silver 69c. to 71c.

NICKEL ANODES

85 to 87% purity	37½c.-39½c.	per lb.
90 to 92% purity	40c.-42c.	per lb.
95 to 97% purity	42c.-44c.	per lb.

Supply Prices, September 2, 1924

CHEMICALS

These are manufacturers' quality prices and based on delivery from New York City.

Acetone	lb.	.15–.16½
Acid—		
Boric (Boracic) Crystals	lb.	.12
Hydrochloric (Muriatic) Tech., 20 deg., Carboys	lb.	.02
Hydrochloric, C. P., 20 deg., Carboys	lb.	.08
Hydrofluoric, 30%, bbls	lb.	.08
Nitric, 36 deg. Carboys	lb.	.06
Nitric, 42 deg. Carboys	lb.	.07
Sulphuric, 66 deg. Carboys	lb.	.02
Alcohol—		
Butyl	lb.	.30–.35
Denatured in bbls	gal.	.50–.55
Alum—		
Lump, Barrels	lb.	.04
Powdered, Barrels	lb.	.04½
Aluminum sulphate, commercial tech	lb.	.02⅜
Aluminum chloride solution in carboys	lb.	.06½
Ammonium—		
Sulphate, tech, Barrels	lb.	.03¾
Sulphocyanide	lb.	.65
Argols, white, see Cream of Tartar	lb.	.27
Arsenic, white, Kegs	lb.	.16
Asphaltum	lb.	.35
Benzol, pure	gal.	.60
Blue Vitriol, see Copper Sulphate.		
Borax Crystals (Sodium Biborate), Barrels	lb.	.05½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.36
Cobalt Chloride	lb.	—
Copper—		
Acetate	lb.	.37
Carbonate, Barrels	lb.	.18
Cyanide	lb.	.48
Sulphate, Barrels	lb.	.05¼
Copperas (Iron Sulphate, bbl.)	lb.	.02
Corrosive Sublimate, see Mercury Bichloride.		
Cream of Tartar, Crystals (Potassium bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05–.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$75.00
Fusel Oil	gal.	$4.50
Gold Chloride	oz.	14.00
Gum—		
Sandarac	lb.	.26
Shellac	lb.	.59–.61
Iron, Sulphate, see Copperas, bbl	lb.	.02
Lead Acetate (Sugar of Lead)	lb.	.13
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	1.15
Nickel—		
Carbonate Dry	lb.	.40
Chloride, 100 lb. lots	lb.	.22¼
Salts, single bbls	lb.	.10½
Salts, double, bbl	lb.	.10
Paraffin	lb.	.05–.06
Phosphorus—Duty free, according to quantity		.35–.40
Potash, Caustic Electrolytic 88-92% fused, drums	lb.	.08¼
Potassium Bichromate, casks	lb.	.09½
Carbonate, 80-85%, casks	lb.	.05¾
Cyanide, 165 lb. cases, 94-96%	lb.	.65
Pumice, ground, bbls	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls	lb.	.03
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in casks	lb.	.08
Silver Chloride, dry	oz.	.86
Cyanide	oz.	—
Nitrate, 100 ounce lots	oz.	.47½
Soda Ash, 58%, bbls	lb.	.02½
Sodium—		
Biborate, see Borax (Powdered), bbls	lb.	.05½
Cyanide, 96 to 98%, 100 lbs	lb.	.22
Hyposulphite, kegs	lb.	.04
Nitrate, tech. bbls	lb.	.04¾
Phosphate, tech., bbls	lb.	.03½
Silicate (Water Glass) bbls	lb	.02
Sulpho Cyanide	lb.	.45
Soot, Calcined	lb.	—
Sugar of Lead, see Lead Acetate	lb.	.13
Sulphur (Brimstone) bbls	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.36
Tripoli, Powdered	lb.	.03
Verdigris, see Copper Acetate	lb.	.37
Water Glass, see Sodium Silicate, bbls	lb.	.02
Wax—		
Bees, white ref. bleached	lb.	.55
Yellow, No. 1	lb.	.35
Whiting, Bolted	lb.	.02½–.06
Zinc, Carbonate, bbls	lb.	.13–.17
Chloride, 600 lb. lots	lb.	.07
Cyanide	lb.	.39
Sulphate, bbls.	lb.	.03¼

COTTON BUFFS

Open buffs, per 100 sections (nominal).

12 inch, 20 ply, 64/68, cloth	base, 40.85
14 inch, 20 ply, 64/68, cloth	base, 50.80
12 inch, 20 ply, 84/92, cloth	base, 46.20
14 inch, 20 ply, 84/92, cloth	base, 62.25
12 inch, 20 ply, 88/96, cloth	base, 63.25
14 inch, 20 ply, 88/96, cloth	base, 85.15
Sewed Buffs, per lb., bleached and unbleached	base, .65 to .75

FELT WHEELS

			Price Per Lb. Less Than 100 Lbs.	300 Lbs. and Over
Diameter—10" to 16"		1" to 3"	2.75	2.50
" 6" 8" and over 16"		1" to 3"	2.85	2.60
"	6" to 24"	Over 3"	3.15	2.80
"	6" to 24"	½" to 1"	3.75	3.50
"	4" to 6"	¼" to 3"	4.75	Any quantity
"	Under 4"	¼" to 3"	5.35	Any quantity

Grey Mexican or French Grey—10c. less per lb. than Spanish, above. Odd sizes, 50c. advance.